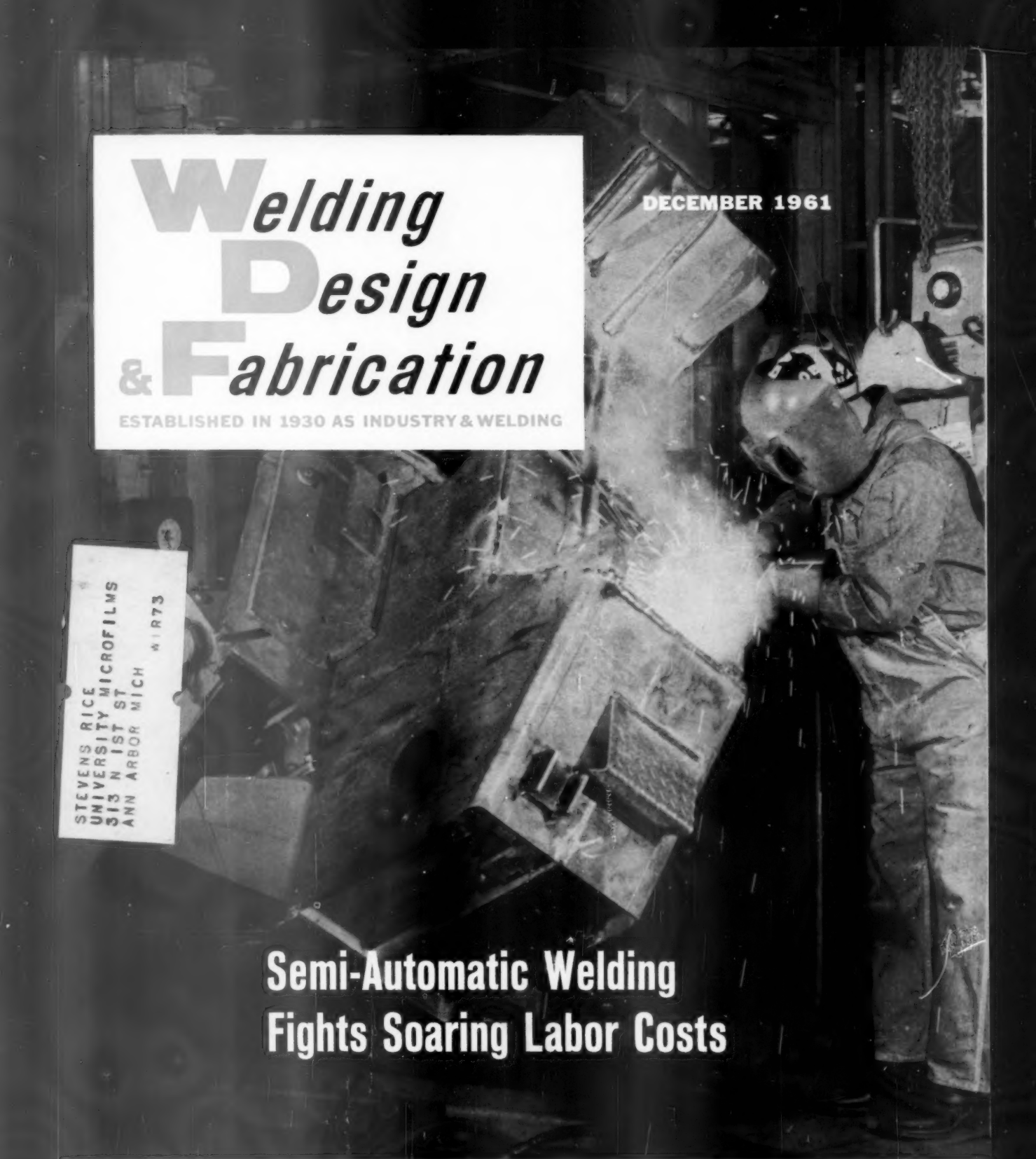

Welding Design & Fabrication

DECEMBER 1961

ESTABLISHED IN 1930 AS INDUSTRY & WELDING

STEVENS RICE
UNIVERSITY MICROFILMS
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Semi-Automatic Welding Fights Soaring Labor Costs

N INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

ALSO IN THIS ISSUE

HIGH-STRENGTH STEELS INCREASE TRAILER PAYLOADS

FABRICATING STAINLESS-CLAD NUCLEAR REACTORS

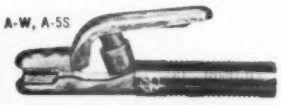
WELDED SURFACE PLATES STAY FLAT

Electrode Holder Selector Chart

Holder Class	Recommended Maximum Amperage	Maximum Rod Size	Recommended Maximum Cable Size	Replaceable Jaw Feature	Weight	Duty Cycle* Rating	Jackson Holder Model
SMALL	200	5/32"	No. 1	no	12 oz.	50%	JH-1
	200	5/32"	1/0	yes	9½ oz.	45%	JH-2
MEDIUM	300	7/32"	2/0	no	19 oz.	50%	AW-C
	300	1/4"	2/0	yes	14 oz.	45%	A-W
	300	1/4"	2/0	yes	15¾ oz.	45%	JH-3
	300	1/4"	2/0	no	17 oz.	50%	B-1
	350	1/4"	2/0	no	22 oz.	50%	A-1
	350	1/4"	2/0	no	23 oz.	50%	ST-3
LARGE	400	5/16"	3/0	yes	21 oz.	50%	A-5S
	400	7/32"	3/0	no	19 oz.	65%	B-4
	450	3/8"	3/0	no	24½ oz.	65%	B-3
	450	3/8"	3/0	no	29 oz.	65%	A-3
	450	3/8"	4/0	no	28 oz.	65%	ST-5
EXTRA LARGE	500	3/8"	4/0	no	32 oz.	80%	A-3S
	500	3/8"	4/0	yes	32 oz.	80%	AA-3S

*The Duty Cycle Rating is the maximum percentage of actual arc-time (out of any 10-minute period) that a holder should be expected to perform comfortably.

Here are the *facts* that will get you the best buys in electrode holders. Go into the table with your requirements, come out with the best possible holder selection for *your* needs. The maximum amperages and duty cycle ratings we show are honest, conservative figures. Trust them. The replaceable jaw feature, offered in five Jackson models, pays worthwhile dividends in longer holder life. Tear out the chart. Use it.



Featherlight

Tongs are of aluminum alloy with replaceable jaws of copper alloy. All-purpose holders that are easy to use, cut fatigue.

Streamlined

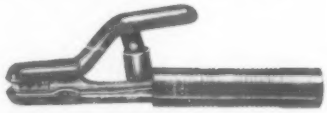
These are of Featherlight construction, with compact, low-profile design. The most fully insulated Jackson holders.

Sealed Tight

The 98% copper alloy holders with a cable connection that's made mechanically but conducts current as though fused.

Economy

These semi-insulated copper alloy holders have exposed tongs. For production line service at lowest possible cost.



High Production

High duty cycle ratings, replaceable part design, and heat resistant insulation qualify these copper alloy holders for high production use. You'll find one in every size class.

Sold Everywhere by Better Welding Supply Distributors

Jackson Products

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Circle No. 37 on Reader Service Card ⟶

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Cutting Tip... Type 3-101, size 1* (cuts to 1")
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reader's guide to

for December, 1961

COVER: Fabricating a box-section for a power shovel is a job for semi-automatic CO_2 welding at Thew Shovel Company, Lorain, Ohio. The welding equipment from Hobart Brothers Company includes a semi-automatic wire feed unit hung from a wall bracket jib crane that feeds wire to a water-cooled gun. Power source is a 900 amp constant voltage welder. A report on the various semi-automatic welding processes and how they save time and money starts on page 35.

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SPECIAL REPORT/SEMI-AUTOMATIC WELDING

35 SEMI-AUTOMATIC WELDING FIGHTS RISING LABOR COSTS

36 HOW TO SELECT SEMI-AUTOMATIC WELDING EQUIPMENT

38 TRADE NAME INDEX

39 COST-CUTTING CASE HISTORIES

FEATURES

46 HIGH-STRENGTH STEELS MEAN BIGGER PAYLOAD ON TRAILERS
This company naturally turned to high-strength steel to lighten trailers. The extra capacity and unusual beam have truckers talking.

48 HOW ALLIS-CHALMERS FABRICATES STAINLESS CLAD REACTOR VESSELS
There's a whole list of things to know and do in building nuclear reactor vessels. Prominent among these: Metal selection, welding techniques, inspection, cleaning procedure, and heat treatment.

53 EIGHT TIPS FOR GRINDING WHEEL SAFETY
There is little danger of injury during grinding operations if the proper steps are taken. This article lists these steps to cut the danger of injury to a minimum.

57 WELDED SURFACE PLATES STAY FLAT
Surface plates are used to measure flatness. Cast surface plates change with the temperature. So, W. B. Knight Company made one of welded steel. It's better in many ways.

61 SIX HUNDRED TON TUNNEL WELDMENTS FLOAT TO THE JOB
Welded fabrications can be huge—and still deliverable. One fabricator built 300-foot, 600-ton steel weldments, then floated them to the tunnel site.

64 WELDED DIMPLED JACKET CUTS REACTOR COSTS
Alloy Crafts Co. uses a new design concept, dimpled stainless steel reactor jackets, to save money on material costs.

66 SPOTLIGHT ON FABRICATING
Case histories show how welding fabricators are making products of extreme size to close tolerances.

68 HIGH PRESSURE DOESN'T FAZE WELDED SLUSH PUMP
Fluid stresses on the valve pots and cylinder bodies of a 1,250 hp slush pump are immense. This company welds forgings for critical parts and gets strength to spare.

DEPARTMENTS

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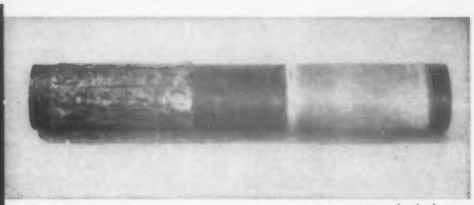
How flame spraying can pay for itself in your shop in a very short time

ONE EXAMPLE
Hard facing time cut from 4 hours to 25 minutes



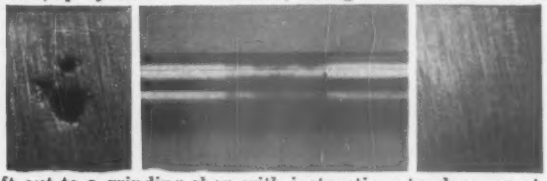
unretouched photo

The two end sections of this shaft have been built up with AMS 4775. Section at left applied by welding – time 4 hours; section at right by flame spraying – time 24 minutes, 45 seconds.

QUESTION: Look at the picture. Which end would you prefer to grind finish?

Here's the whole story. We took a 15" length of 2.5" mild steel shafting and undercut two 5" sections .050" on the radius. We then sent the shaft to a nationally-known job shop with instructions to apply AMS 4775 on the left-hand section, sufficient to finish at 2.5". Weight of welded-on alloy was 17 9/16 ounces – time spent by one of their top men – 4 hours (including preparation).

Then we blasted the second section with steel grit and flame sprayed it with AMS 4775 in powder form (ThermoSpray Powder 15E). The coating was then torch-fused. Weight of deposited alloy – 11 5/16 ounces; surface preparation, set-up and pre-heat – 12 minutes; spray time – 5.5 minutes; fusing time – 7.25 minutes.



Unretouched photo, in center, shows finish-ground shaft. Insets, magnified about 50X, show pits in welded section (left) and no pits in flame sprayed section at right.

We then sent the shaft out to a grinding shop with instructions to clean up at 2.500" plus. The flame-sprayed section cleaned up at 2.510" but welded section still showed pits when grinding was stopped at 2.477" Rockwell of welded end Rc-61, sprayed end Rc-60.

Pump plunger being flame sprayed with METCO ThermoSpray® Powder Gun

These flame-sprayed coatings are solid, homogeneous; usually superior to those applied by other methods. You can apply them at high speed, with lower material and finishing costs. In addition to AMS 4775, a number of other powders – including tungsten carbides – are available for various service requirements; all may be fused–some used as sprayed for certain service requirements.

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World's largest steam surface condensers rely on M&T Murex electrodes

It takes huge condensers to handle over six million pounds of steam an hour. Right now Foster Wheeler Corporation is fabricating two of these giants for a large southern utility. Fully assembled, each weighs 800 tons, measures 82½ ft. long, 28 ft. wide, 43½ ft. high. Each unit has 300,000 sq. ft. of tube surface. In welding these twin record-breaking condensers, Foster Wheeler relied on M&T Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

M&T MUREX
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33 MODELS THEY ALL HAVE WIDE BLADES

HERE'S WHAT 18% MORE BLADE WIDTH MEANS TO YOU

This much more weld cleaned in the same amount of time with the same amount of effort.

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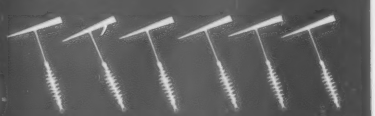

It's like getting a free tool every time you buy five, because the new wide blades wear longer.

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MEN ON THE MOVE

in the welding industry

PROMOTIONS:

Donald C. Helton has been named manager of the Milwaukee district office for the Welding Products Division of Harnischfeger Corp., Milwaukee.

J. T. Walmsley has been appointed Denver area manager for the Distributor Products Department of Linde Company, Division of Union Carbide Corp.

Ralph D. Newell has been named advertising and sales promotion manager for medical, industrial, and dental x-ray lines by General Electric X-Ray Department, Milwaukee.

Four group vice presidents have been appointed by Metal & Thermit Corp.: **H. E. Hirschland,** in charge of commercial development and research divisions; **B. W. Weber,** manufacturing, employee relations, and administration divisions; **J. L. Oberg,** minerals, ceramics, and welding divisions; **D. W. Okley,** chemicals, coatings, and plating divisions.

Eutectic Welding Alloys Corp. has announced a new National Accounts Division to serve their large volume users throughout the U. S. and Canada. The first four representatives are: **Robert Whitney,** serving the greater metropolitan New York area; **John Ryan,** serving the greater Detroit and southeastern Michigan area; **Robert A. Wright,** serving the greater St. Louis area; and **Norman Day,** in the Southern California area.

Frank L. Brandt has been appointed vice president of the Lynn Division of Thomson Electric Welder Co., Inc., Lynn, Mass.

W. T. Swomley has been named vice president in charge of finance for Eastern Stainless Steel Corp., Baltimore.

continued on page 8

Circle No. 48 on Reader Service Card. ⟶

World's tallest structure relies on M&T Murex electrodes

Almost 1000 tons of steel stretching 1676 feet into the sky! This new television transmission tower for KFVS-TV, Cape Girardeau, Missouri, is the tallest structure man has ever built. It's 204 feet taller than the Empire State Building, has solid steel legs up to 7½" in diameter, can withstand winds of over 100 mph. In welding the 30-ft sections of this triangular tower of strength, Dresser-Ideco Company put its trust in M&T Murex electrodes... products of METAL & THERMIT CORPORATION, Rahway, New Jersey.

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Torch Brazing with GB Silver Brazing Alloys and GB #88 Flux assures freedom from failures!

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GB #88 Flux, known for its low glare and low fuming qualities, is available in 3 oz. jars, ½ lb, 1 lb and 5 lbs, and 25 to 50 lb drums.

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For More Information Circle No. 32 on Reader Service Card.

MEN ON THE MOVE

continued from page 6

PROMOTIONS:

U. R. (Rick) Jaeger has been appointed special projects manager of the Metal Division, Olin Mathieson Chemical Corp. **C. O. Kunz** succeeds Mr. Jaeger as sales manager of Roll-Bond products.

Roger Gabbei has been promoted to Midwest sales manager of Amperex Electronic Corporation.

Robert H. Wasz has been appointed assistant vice president of Joseph T. Ryerson & Son, Inc., Chicago. **Norman F. Rewoldt** succeeds Wasz as general manager of the Ryerson plant in San Francisco.

Three management appointments have been announced by OMARK Industries, Inc., Portland, Oregon. **David G. Bogue,** merchandising manager; **Paul J. O'Herron,** field service manager for all Omark products; and **Everett Lillig,** U. S. manufacturing division manager.

C. J. Lankley has been appointed manager of Air Reduction Sales Company's Philadelphia district. W. W. Littlefield has been appointed manager of the Arlington, Texas district.

Vincent P. Greeley has been appointed manager of the New England region for Nottingham & Co., Inc.

Charles R. Wilt, Jr. has been appointed assistant chief engineer of the Selas Corporation of America, Dresher, Pa.

APPOINTMENTS:

Machinery & Welder Corp., Chicago, has appointed new officers: **R. L. Kohlbry,** president; **Wilbur Juergens,** secretary and treasurer; and **G. F. Meyers,** vice president. They will also make up the board.

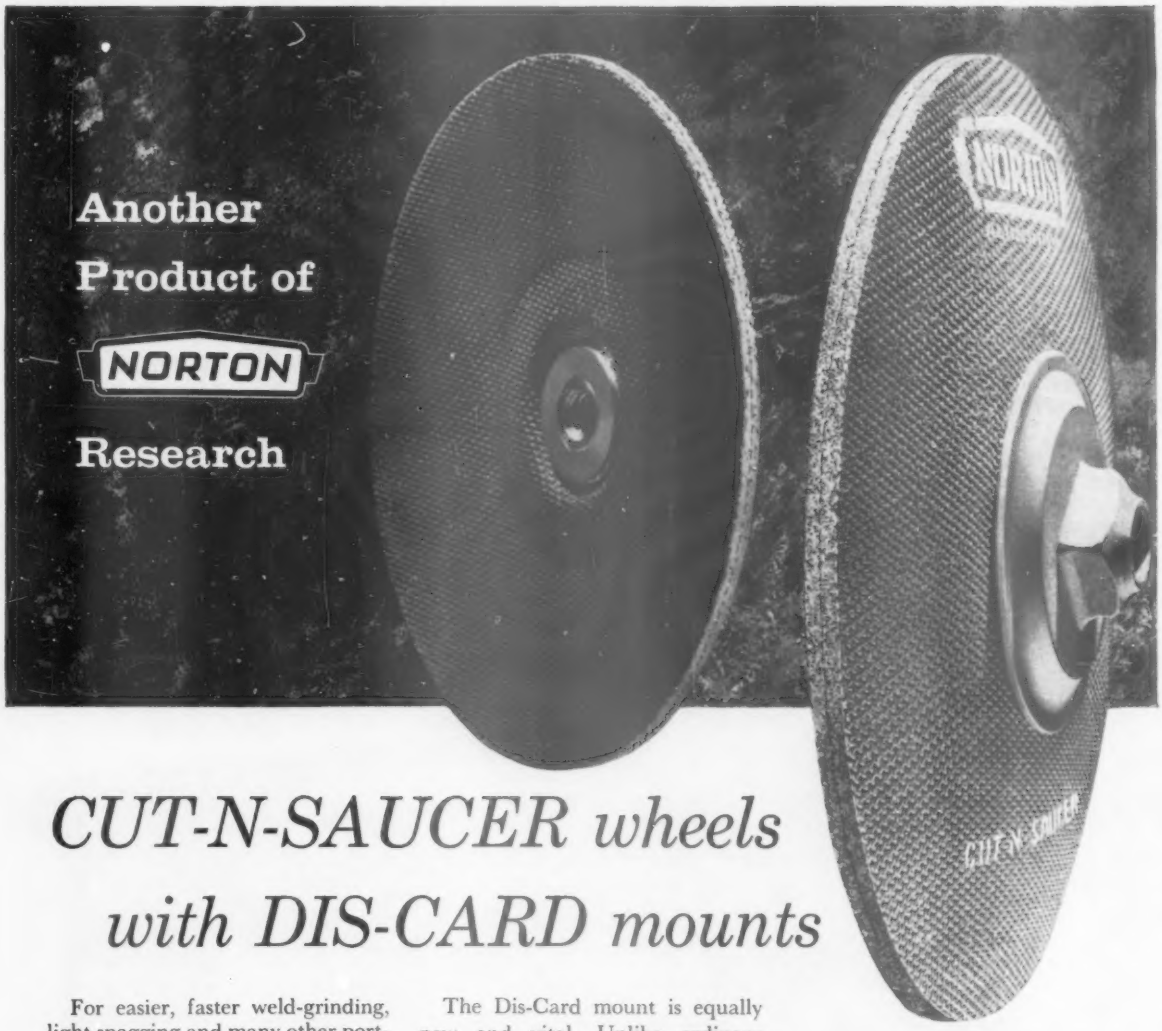
continued on page 11

Circle No. 49 on Reader Service Card. ⟶

World's biggest hopper trailer relies on M&T Murex electrodes

This 70-ton colossus can lug 95 cu. yds. of coal in one load. It is 47½ ft. long, 12 ft. wide, 13½ ft. high. When loaded, the trailer and its tractor weigh more than 119 tons. It takes rugged durable construction to withstand the continuous abuse this trailer takes as hundreds of tons of coal slam and pound it daily. In fabricating the world's largest hopper trailer, Marion Metal Products Co. relied exclusively on M&T Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, N.J.

M&T MUREX
PRODUCTS FOR BETTER WELDING



CUT-N-SAUCER wheels with DIS-CARD mounts

For easier, faster weld-grinding, light snagging and many other portable grinding jobs, Norton offers you:

Reinforced wheels that combine a saucer shape with a disposable mount.

These are the new BSA Type Cut-N-Saucer wheels with Dis-Card mounts . . . available in 7" and 9" diameters. They are produced in the big new Norton Plant 8, built specifically to improve the manufacture and performance of resinoid wheels.

Reinforced with layers of fibre glass, BSA Cut-N-Saucer wheels gain added advantages from the new shape. Compared with straight wheels, Norton BSA wheels on the job can be held at angles much closer to the horizontal. Results are easier control and reduced operator fatigue.

The Dis-Card mount is equally new and vital. Unlike ordinary mounts it is no separate attachment. It is permanently secured — designed to be bought and thrown away with every wheel. This means you can change wheels in seconds — completely eliminating "lock washer" action and the usual mounting routine that can take up to half an hour. So every Cut-N-Saucer wheel you buy is already mounted — and *stays* mounted, throughout wheel life.

Yet you pay no more for a Norton Cut-N-Saucer than for a conventional reinforced wheel!

NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

Also Available — a complete line of cups, cones and straight wheels in the 44 ALUNDUM abrasive and B11 resinoid bond combination that assures fast cutting action with long wheel life.

W-2023A

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NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION, Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

For More Information Circle No. 58 on Reader Service Card.

MEN ON THE MOVE

continued from page 8

Alfred F. Chouinard, director of research and development for the NCG Division of Chemetron Corporation, Chicago, has been appointed a member of the National Sponsoring Committee of the Celebration of the American Patent System.

Richard P. Conniff has joined American Machine & Foundry Company's Government products group as manager of its Washington region office.

George E. Sykora has been appointed manager—standards and quality control of the Instrument Division of the Budd Company, Phoenixville, Pa.

Winston C. Perdue has been named a technical service engineer for Metal & Thermit Corporation's Murex Welding Products Division.

W. G. (Will) Brooks has been appointed staff sales engineer, Automatic Welding Division of Hobart Brothers Company, Troy, Ohio.

ELECTIONS:

ALPERIN

RIESMAN

The Crescent Company, Pawtucket, R. I., has elected two officers and directors. **Max Alperin** has been elected director and chairman of the executive committee. **Robert A. Riesman** was named director and executive vice president. He also assumed the post of president of Carol Cable Company, Crescent's affiliate.

Howard N. Smith succeeds **Alf E. Anderson Sr.** as president of the Albert & J. M. Anderson Mfg. Co., Boston. Mr. Anderson has retired from the position but will remain as chairman of the board.

William B. White has been elected vice president, administration of High Vacuum Equipment Corp., Hingham, Mass.

Leslie S. Wilcoxson, vice president of Babcock & Wilcox Company's Boiler division, has been elected chairman of the Welding Research Council-Engineering Foundation, for a three year period.

Air Products and Chemicals, Inc., Allentown, Pa., has added two members to the firm's board of directors. The new directors are **Robert B. Swope** and **Robert P. McMillan,** chairman and president, respectively, of Southern Oxygen Company which was recently acquired by Air Products and Chemicals.

Robert A. Lubker has been named vice president research and development Alan Wood Steel Company, Conshohocken, Pa.

RETIREMENTS:

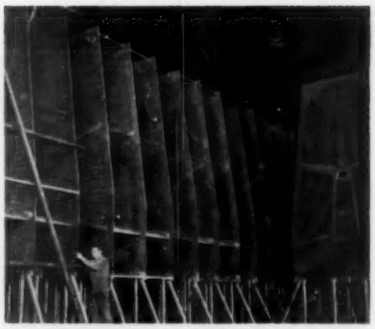
Harold P. Blum, Cleveland-Akron district sales representative for Metal & Thermit Corporation's Murex Welding Products Division.

HONORS:

Patrick R. Scott of Kettering, Ohio, a third year welding engineering student at Ohio State University, has been awarded the York Engineering—Chicago Welding Sales 1961-62 scholarship for welding engineering.

DEATHS:

Cecil C. Peck passed away after a long illness at his home in Cleveland, Ohio. Mr. Peck founded the Cecil C. Peck Company as designers and builders of automatic welding equipment and was president and board chairman of the company until his death.



Largest

Tallest

Biggest

M&T Murex electrodes weld three huge ones

On the three preceding pages, you saw three more of the rugged applications in the long list of important, demanding welding jobs recently completed with M&T Murex electrodes.

That list includes a wide variety of products, requiring many different types of electrodes. With over 1000 types and sizes to choose from, the M&T Murex line includes just about every electrode you'll ever need.

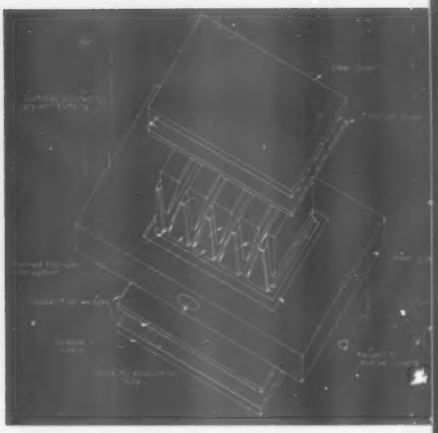
The entire listing, including *Low Hydrogen, Iron Powder* and *Stainless Steel,* is in our new "Electrode Selector." Send for it.

M&T MUREX **welding products**

METAL & THERMIT CORPORATION

General Offices: Rahway, New Jersey

Circle No. 50 on Reader Service Card.



CORE ASSEMBLY is prepared by inserting solid metal filler wedges in the corrugations of the care sheet (left). Elements of the sandwich pack (right) are held in place during hot rolling by steel cover sheets welded to a rectangular steel frame. After rolling, the frame is sheared off and the protective covers peeled away.

Battelle develops roll welding of sandwich panels

COLUMBUS, OHIO: A method of producing corrugated-core sandwich panels that is said to reduce costs substantially has been developed in research sponsored by the Douglas Aircraft Co. Battelle Memorial Institute did the work and reports the method needed no jigging, provides completely sound core-to-cover bonds, and allows the panels to be formed extensively after assembly.

The process—called roll-welding—uses hot rolling to pressure weld the peaks of the corrugated metal core to the cover sheets.

Size of the sandwich panels is limited only by rolling-mill capacity. Panels ¼-inch thick and as large as 36- by 72-inches have already been produced. Roll welded sandwich panels have been made of 2014 aluminum, B-120 VCA titanium, unalloyed A-55 titanium, steel, molybdenum, and Inconel.

To form the corrugated core an accordion-pleated sheet of metal is woven over and under V-shaped inserts of a chemically soluble deformation-resistant metal such as copper or iron. A rectangular metal frame is placed around the core, and the face sheets of the sandwich are added. The entire assembly is clamped in place by two additional metal cover sheets, which are welded to the rectangular frame. The whole package is then hot rolled in a direction parallel to the corrugations.

Rolling also reduces the thickness of the panel up to 60 percent to provide desired corrugation shapes.

The retaining frame is sawed or sheared off after rolling and the metal covers which were welded to the frame are peeled away. With the support wedges still in place, the sandwich panel can now be formed into a wide variety of shapes, including hemispheres, without buckling the core. Standard tooling can be used, and the panel can be worked as though it were a solid metal plate of equal thickness.

The V-shaped inserts are then leached out of the formed structure with a chemical reagent, such as nitric acid. Although leaching takes several days for very large panels, it is a straight-forward operation and is relatively inexpensive. Leaching can be accelerated mechanically if necessary.

more news on page 80

NEWS BRIEFS

THE LARGEST AND MOST COMPLETE welding industry show ever held in San Diego is the way local newspapers described this Weld-O-Rama held recently by G. S. Parsons Co. The latest methods and equipment for welding and cutting were displayed and demonstrated by representatives of Parsons' suppliers. Complete welding outfits were given away as attendance prizes.

HANDY & HARMAN, fabricators and refiners of precious metals, has relocated two of its plants. The New York plant has moved from New York City to 525 Nuber Avenue, Mount Vernon, N. Y. The Providence plant has moved to 845 Waterman Avenue, East Providence.

A $3.9-MILLION CONTRACT to construct three river crossings has been awarded to a joint venture composed of Healy Tibbitts Construction Co., C, K, F-M and Graver Tank & Mfg. Co., a division of Union Tank Car Company.

. . . . *please turn page*

Unequalled for performance and economy...

MECO

Welding and Cutting Equipment

MECO equipment has a 50-year record of reliability and superior performance—and it is easier to put back in top working order if repairs are necessary. These operating advantages result from exclusive design features, superior workmanship and years of specialization.

The MECO line is most complete, which enables you to select welding and cutting equipment best suited to your needs. Save time, trouble and get more for your dollar with MECO.

CUTTING TORCHES

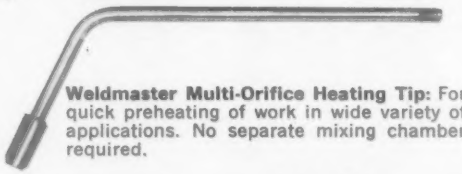
Standard CUTMASTER Cutting Torch: Most widely used cutting torch for general purpose work. Oxy-acetyelene, propane or natural gas models available. Choice of 2 interchangeable angle heads.

Super CUTMASTER Cutting Torch: For use on heaviest of hand cutting jobs, for precision work and for general cutting. Oxy-acetylene, propane or natural gas models available. Choice of 3 interchangeable angle heads.

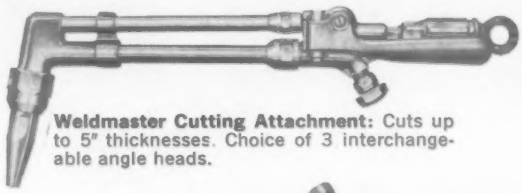
Type "O" Machine Cutting Torch: Most adaptable of its kind. Used with 2 or 3 hoses. Choice of racks or plain barrel. Oxy-acetylene, propane or natural gas models available.

WELDING TORCHES

Weldmaster Torch: For every welding and heating application. Light in weight, yet rugged.



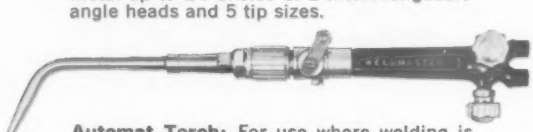
Weldmaster Multi-Orifice Heating Tip: For quick preheating of work in wide variety of applications. No separate mixing chamber required.



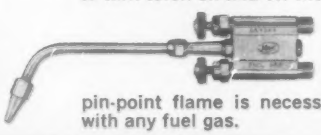
Weldmaster Cutting Attachment: Cuts up to 5" thicknesses. Choice of 3 interchangeable angle heads.

Aviator-Jet Torch: For all types of sheet metal welding, particularly adaptable to production line applications.

Aviator-Jet Cutting Attachment: Capable of cutting all commercial thicknesses of sheet metal up to 2". Choice of 2 interchangeable angle heads and 5 tip sizes.

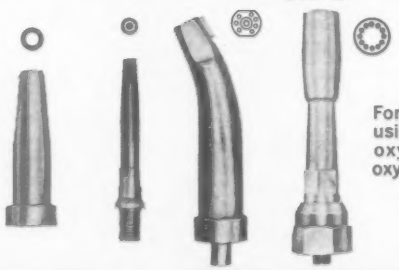


Automat Torch: For use where welding is subject to frequent interruptions. Thumb control valve and pilot light enables operator to turn torch on and off without reigniting.



Miget Universal Torch: For use in precision work where a minute, pin-point flame is necessary. Uses oxygen with any fuel gas.

TIPS



For all types of work using oxy-acetylene, oxy-propane and oxy-natural gases.

50 YEARS SERVICE

PIONEERING THE DEVELOPMENT OF BETTER EQUIPMENT FOR INDUSTRY SINCE 1911

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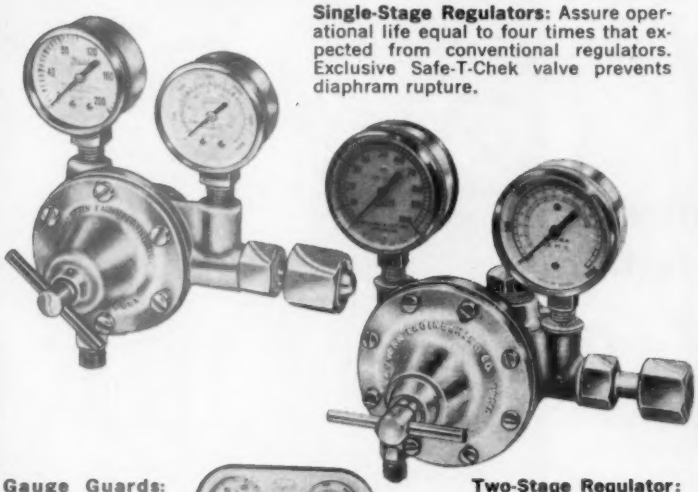
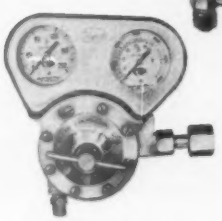
WELDING AND CUTTING REGULATORS

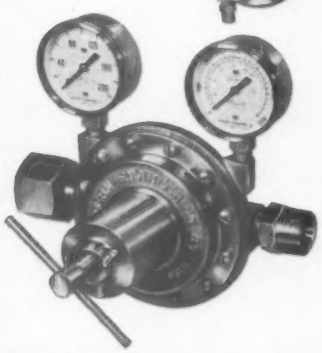


Single-Stage Regulators: Assure operational life equal to four times that expected from conventional regulators. Exclusive Safe-T-Chek valve prevents diaphram rupture.

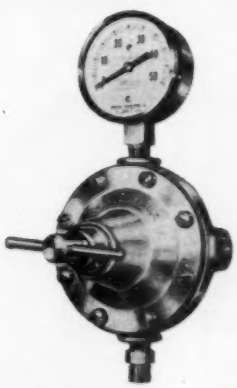


Gauge Guards: Provide maximum protection against gauge damage. Easy to install on single or two-stage regulators.

Two-Stage Regulator: For the many cases where extremely close regulation and uniform flow is required. Exclusive Safe-T-Chek valve prevents diaphragm rupture.



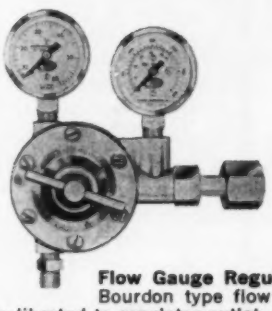
Manifold Regulator: For manifold work where flows up to 4000 CFH are required and for inlet pressures up to 3000 P.S.I. Exclusive Safe-T-Chek valve prevents diaphragm rupture.



Station Regulator: Provides extremely close station regulation on distribution systems of oxygen, hydrogen and fuel gas.

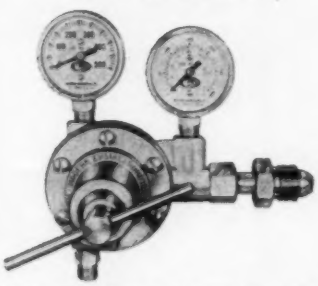
INERT GAS REGULATORS

Flow Meter Regulators: Most rugged flow meter and regulator combination on the market. Exceptionally accurate. Knurled valve at top of column gives finger-tip control from zero to full capacity. Single-stage or two-stage models available.



Flow Gauge Regulators: Bourdon type flow gauge is calibrated to regulator outlet. Single-stage or two-stage models available.

PRESSURE TESTING REGULATOR



Multi-seat block and stainless steel diaphragm assure longer operational life.

LIGHTERS

Tripl-Flint Lighter: Lasts three times longer than conventional lighters.

Tripl-Flint-Lok Safety Lighter: Safest lighter ever made. It cannot accidently spark even when dropped.

JIFFY SOLDERING AND BRAZING EQUIPMENT

Jiffy Torches: For light service work and home use. Air-acetylene or air-propane models available . . . plus full range of tips, a leak detector and soldering coppers.

Jiffy Regulator: Made of machined, extruded aluminum. Acetylene or propane gas models available.

Only a representative selection from the complete MECO line is shown. For more information, see your MECO distributor or write . . .

MODERN ENGINEERING COMPANY
3401-15 PINE BLVD. ST. LOUIS 3, MISSOURI

MECO

For More Information Circle No. 54 on Reader Service Card.

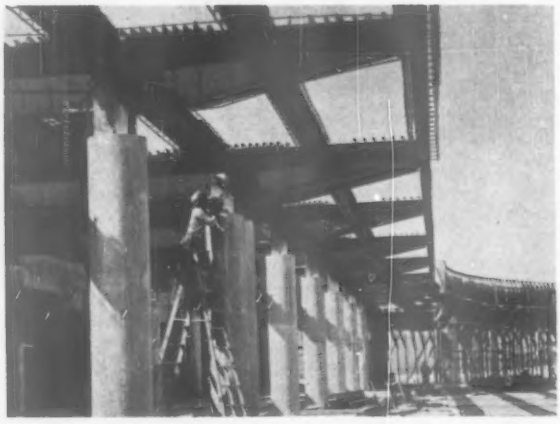
WELDING AT WORK

to do the job better and cheaper

Shipyard welding operators pass rigid qualification tests

CAMDEN, N. J.: Close-quarters welding encountered in shipboard work on reactor piping is duplicated at New York Shipbuilding's school where operators qualify to make nuclear plant pipe welds. Work is deliberately placed near corners and under headroom restriction. The operator must learn to make satisfactory welds under these conditions.

For grinding between passes, operators use Model 913-41 remote-exhaust pneumatic grinders made by Thomas C. Wilson, Inc. Exhaust via a tube concentric with the air supply hose minimizes contamination of weld area by grinder lubricant. Exhaust-tube end is visible near filter-lubricator stand in foreground.



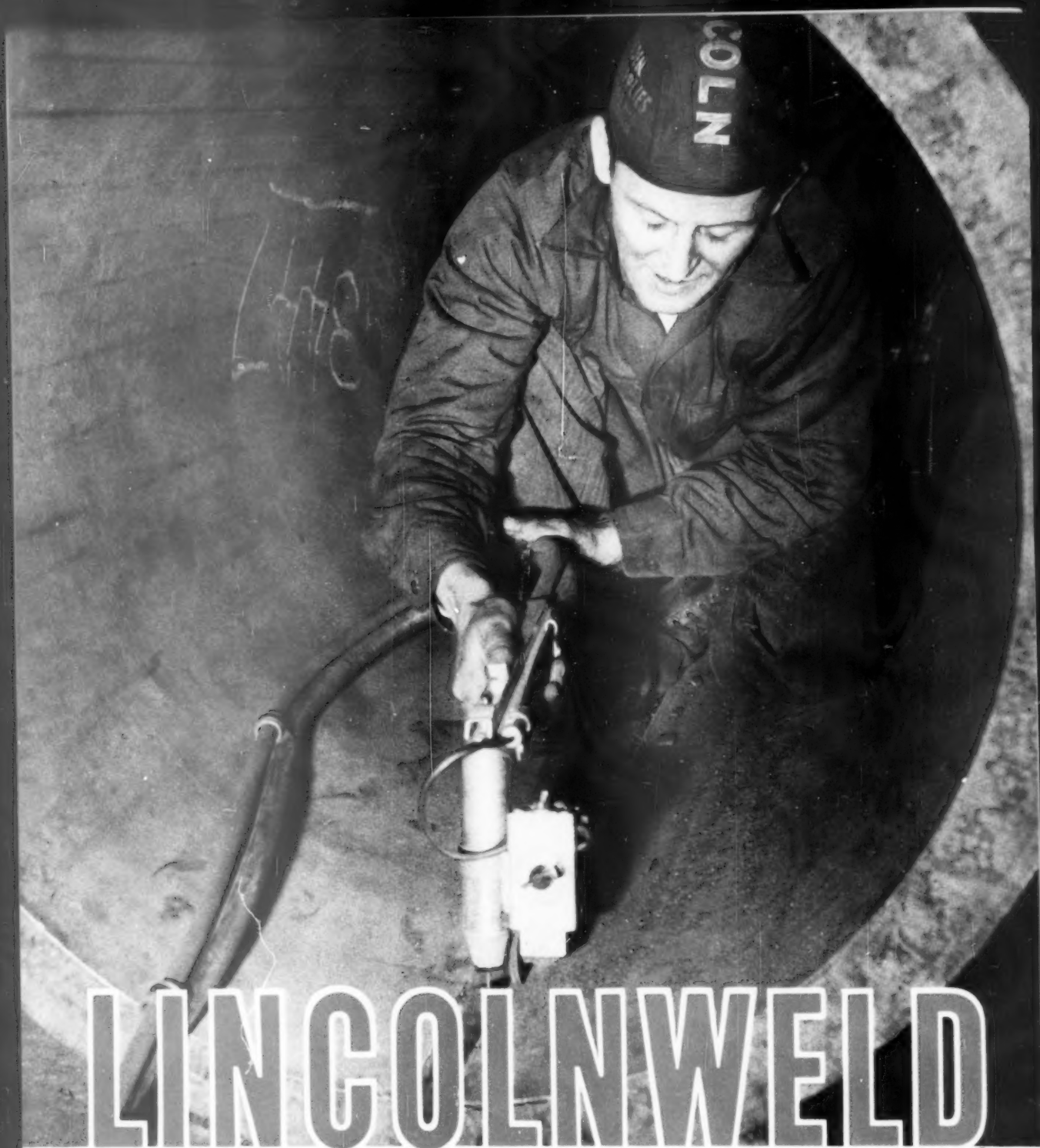
Rigid welded framing for air terminal's reinforced concrete

ATLANTA, GA.: The automobile ramp and buildings for Atlanta's new $20-million air terminal are a blend of rigid welded steelwork and reinforced concrete. Close to 1,000 feet long, the structural steel framing of the ramp had to have maximum strength and rigidity to eliminate unbalanced stresses on the concrete. The rigid design also eliminates external cross-members which would otherwise detract from the modern appearance.

Over 60 acres of 11½-inch-thick reinforced concrete were used on the ramp alone. Prefabricated units of the auto ramp were shop welded with more than 1700 welds and then erected in the field with 400 more welds. Prestressed concrete was then poured around the rigid structural frame.

The terminal building is composed of eight thin concrete barrel-type shells, no more than 4-inches-thick, erected on 160-foot-diameter semi-circles arching across 44-foot long spans. Behind the eight 500-foot-long shell structures rises a 12-story combination administration building and control tower.

Welding of all moment plates and connections was done with Metal & Thermit's Speedex E-6024 electrodes for horizontal work. M&T's Murex Type R electrodes were used for all other welding.



Dilemma! What do you do when complex parts or short production runs limit you to a manual welding process . . . yet where your product's design and end use clearly require deep penetration and X-ray quality welds at highest speeds? Solution. Use **Manual Lincolnweld** submerged arc welders. The next few pages show how your competitors put these to profitable use. Want to see how? Turn the page.

These are MANUAL LINCOLNWELD "Squirt"® welders on the job

Operator welding this heavy machine base demonstrates versatility of ML-2 equipment. This process is particularly outstanding for getting high speeds and deep penetration on positioned fillet welds. Many use ML-2 as hand-held process but with work revolving beneath the gun on rotating, turntable positioner.

Continuous ¼-inch fillet welds in this hopper are made with ML-3 equipment at the rate of 32 inches a minute. Serrated wheel resting on work drives the gun at pre-set speeds. Flux and wire are fed into work at pre-determined rates. You get degree of control over finished welds simply not attainable by hand methods.

What does submerged arc welding have that manual welding doesn't? Basically, this. You can use much higher currents which result in proportionately higher deposition rates. These, in turn, result in higher production speeds, lower costs. Fewer pre-weld operations such as plate beveling are needed, and less metal is needed in the joint because of its inherent high penetration. Because welding current and arc length are both controlled automatically, you get consistently fine welds time after time. And, with the weld totally enveloped in flux, there simply is no spatter. Result? Better-looking welds that require few, if any, post-welding operations. All these factors translate into a long-term ability to produce quality products, at higher speeds, with lower costs.

LINCOLN WELDERS

Lincoln makes two models of "Squirt" Welders for hand-held submerged arc welding. One is the ML-2, the other, the ML-3. Both units have continuous wire feed and use granular flux. Essential difference between the two is that the ML-2 holds enough flux in its gun for about 10 feet of weld, while the ML-3 has flux fed through a tube to the gun and so can weld indefinitely without stopping. In addition, the ML-3 gun can be equipped with small travel unit having a serrated wheel which drives the gun at pre-set speeds along the work. This removes travel speed as an operational variable and leaves only directional guidance up to the operator. Both can be used in conjunction with either positioners or simple fixtures in order to remove that last variable, direction control.

Lincolnweld "Squirt" Welders can be utilized to do a variety of jobs whether used as completely manual equipment or in highly automated and fixtured set-ups. And, because you have relatively low initial capital investment, you are not committed to any particular type of production, process or product. In other words, your production lines can stay flexible, adaptable to changing product needs.

Contact your nearest Lincoln field engineer . . . a specialist in welding. Let him show you how you can put this flexible, versatile equipment to work increasing production and quality in your plant, shop or factory. Why not do it now?

Here, compact ML-2 gun fits into confined areas inaccessible to full-automatic equipment. While this process is not as fast as the full-automatic, it is considerably lower in installation costs; but most important, it is faster and more economical than stick welding where you require deep penetration at highest speeds.

Custom welding tasks such as this can be done best with ML-2 equipment fitted with new continuous flux feed attachment. As soon as this job is done, equipment can be switched to production of entirely different kind of task. Operators like the submerged arc because there is no flash, no need for headshield. Job is cooler, easier to follow.

Put one of these . . .

MANUAL LINCOLNWELD

Submerged Arc Welders to work for you

ML-2 "SQUIRT" WELDER

Total machine consists of wire reel case, control box with wire feed motor, welding gun and necessary cables. Current is supplied by a separate power source. Wire feeding mechanism is governed by a simple voltage control that maintains a constant arc length between electrode and the work by controlling wire feed speed.

Variations in arc length caused by manual handling are compensated for automatically. For more information about ML-2, ask for bulletin 5204.1.

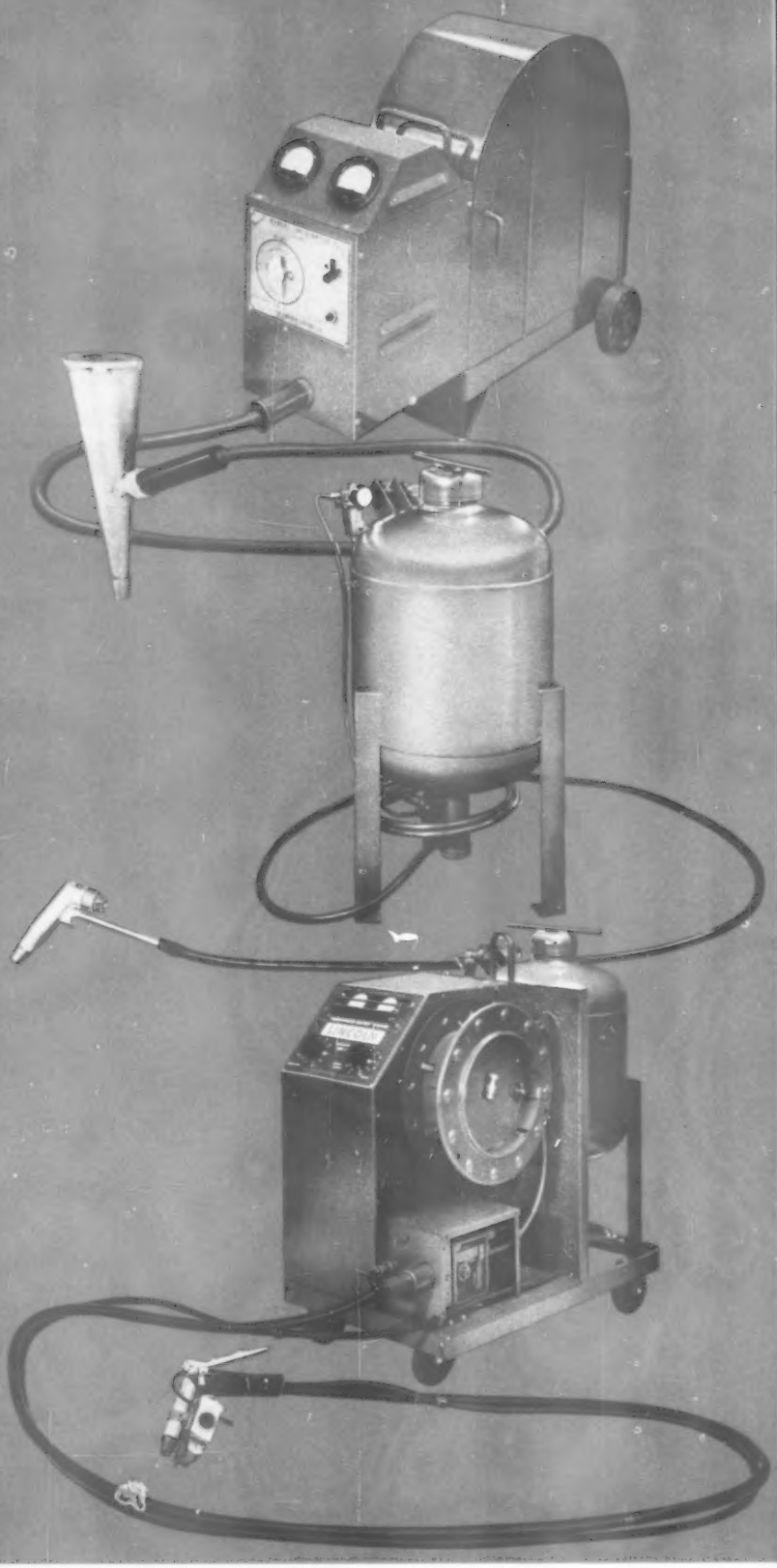
CONTINUOUS FLUX FEED ATTACHMENT FOR ML-2 WELDER

New special welding gun and flux tank provide a continuous flux feed system for ML-2 (or old ML-1) welders. Adds to their versatility, saves time, improves work quality since operator does not have to stop periodically to fill flux hopper. New gun, which fits to ML-2 handle, lets operator get into confined areas easier and at same time, keep gun better aligned over the work.

ML-3 "MECHANIZED SQUIRT" WELDER

Unit furnished complete with gun, cables and welder which incorporates wire feed motor, arc voltage and inching speed controls, ammeter and voltmeter which allow precise settings. Gun itself incorporates serrated drive wheel, speed control and travel reversing switch which lets operator weld in either direction according to the dictates of the job. Single press bar and trigger apply welding current, activate travel motor, electrode feed, and flux valve.

FOR MORE INFORMATION on Lincolnweld ML-3 equipment, request bulletin 5205.1 from your local field engineer. Or, if you prefer, write direct to the factory. Your request will be handled by return mail.



THE LINCOLN ELECTRIC COMPANY

The World's Largest Manufacturer of Arc Welding Equipment and Electrodes

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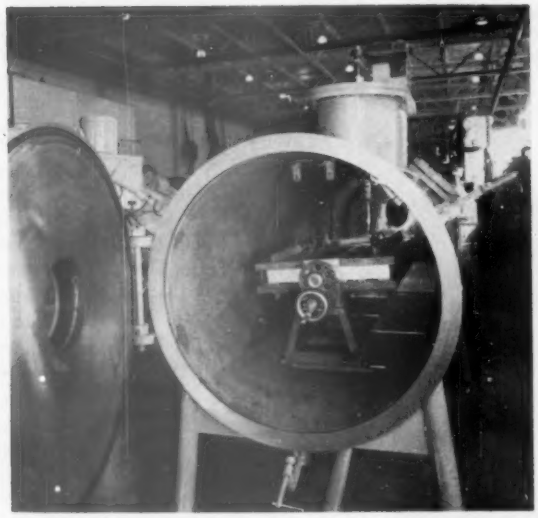
LINCOLN ...USA

WELDING MANAGEMENT

watches these developments



IT MAY BE POSSIBLE to fabricate nuclear submarine hulls of titanium alloys as the result of new welding procedures developed at Battelle Memorial Institute. Hulls made of titanium alloys—which are as strong as many steels and weigh only two-thirds as much—would provide submarines with great speed, payload, and diving depth. Battelle welding experts report they have produced crack-free welds in 120,000-psi-yield, 2-inch-thick titanium alloy plates. Weld joint properties equaled or exceed the properties of the base alloy. Welds were made in plates with a double-vee joint design, using an automatically controlled consumable electrode process. Welding was done in an argon-filled chamber (see photo) to prevent contamination that might cause weld cracking.

$100-MILLION will be spent by the Defense Department for machine tools and production equipment for the fiscal year of 1962 (July 1, 1961, to July 1, 1962) as compared to $40-million allocated in 1961. The National Machine Tool Builders' Association reports that 60 percent of the $100-million will be for the replacement of machine tools and about 40 percent will be for new production lines.

PURE COBALT COILED STRIP with good ductility and workability is commercially available for the first time. It is available from Sherritt Gordon Mines Ltd, Toronto, in thickness ranging from .005-inch to .025-inch and in width of ¼- to 6-inches. The strip will be supplied in production lots at prices favoring quantity orders. The improvement in cobalt's properties is said to result from the purity of the product. Sherritt cobalt strip is rolled directly from the company's pure cobalt powder, using a new powder rolling process that produces 99.9 percent pure cobalt strip.

DEVELOPING A METHOD OF GRADING grinding wheels is the object of research to be conducted for the Grinding Wheel Institute by the University of Michigan. Developing such a standard would make it possible for the grinding wheel industry to establish standards for grade of grinding wheels which would be the same regardless of who makes the wheel.

COMPLETION of integrated and specialized facilities for supplying columbium, a columbium—one percent zirconium alloy, vanadium, tantalum, and tungsten has been announced by Haynes Stellite Company, Division of Union Carbide Corp. With the completion of these integrated facilities, Haynes becomes a prime producer and supplier of refractory meals in hot-pressed and mill forms.

FORMATION OF COMPANIES in Australia and France to serve the growing need for metal plate storage tanks and processing structures has been announced by Chicago Bridge & Iron Co., in association with three foreign firms. The new companies are Chicago Bridge-Lennox (Pty) Limited, Alexandria, New South Wales, Australia, and Chicago Bridge et Provence, Arles-sur-Rhone, France.

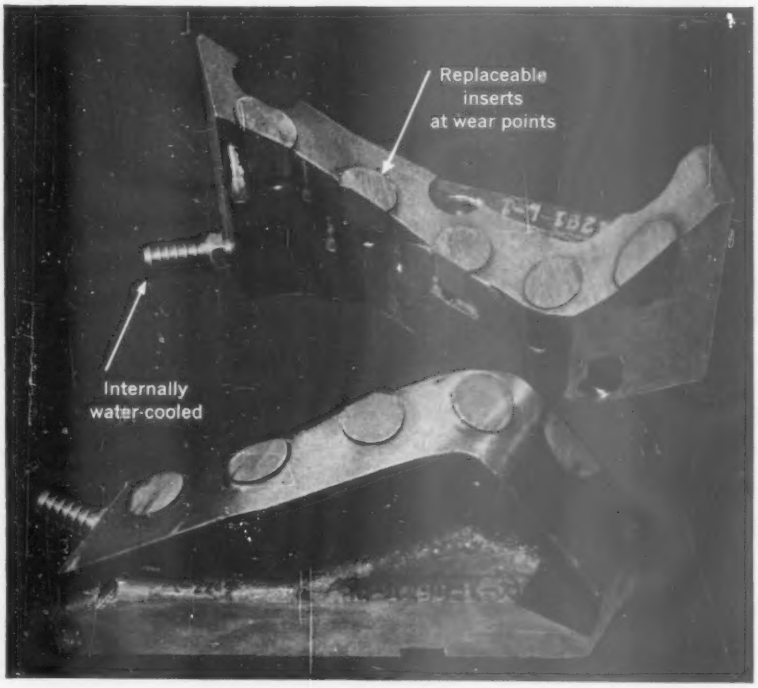
A NEW METHOD of welding thick aluminum plate has been developed by Kaiser Aluminum for use on armored military vehicles, large storage tanks for liquid gases, and other structural and marine uses. The method deposits up to 15 pounds of weld metal per hour and can be used on plate up to 3 inches thick. The method uses large diameter filler wires (up to 7/32-inch) and submerged arc welding equipment in which water-cooled inert gas welding torches replace flux-and-contact tube systems. Only six passes were needed to make a double-U joint in 3-inch plate.

WORLD'S FIRST commercial production of rhenium-tungsten alloy strip has been announced by Chase Brass & Copper Co. The company also announced the production of rhenium-tungsten rod and wire. This is the third time in two years that Chase has achieved a first in the production of rhenium alloys.

← Circle No. 42 on Reader Service Card.

AMPCO®

7 times longer life for projection welding die!



Replacement time and cost reduced almost 75%!

Originally, the projection welding die shown here was cast to contour in one piece and not internally water-cooled. Its life was short. Replacement was expensive, in terms of both money and downtime.

Then Ampco's experience was drawn upon. Working surfaces were changed to incorporate relatively inexpensive refractory inserts which could be quickly replaced. Adequate water-cooling was provided, also. These two factors vastly increased die life.

Ampco has complete facilities and the know-how for making welding dies of all types — flash, butt, projection, and cross-wire. Your Ampco-Weld distributor can put them to work for you. Call him. Write for Bulletin RW-10.

RESISTANCE WELDING ALLOY ASSOCIATION RWMA

RW-22

AMPCO METAL, INC., Dept. 177L, Milwaukee 1, Wis.
West Coast Division: Huntington Park, Calif. • Southwest Division: Garland (Dallas County), Tex.
For More Information Circle No. 14 on Reader Service Card.

LIBRARY

of welding

All About Inert Gases

"Argon, Helium, and the Rare Gases," Volume I, 452 pages, October, 1961; Volume II, 440 pages, to follow in November, 1961. Order from Interscience Publishers, Inc., 250 Fifth Avenue, New York, N. Y. $17.50 each.

This is an extensive survey of the inert gases by fifteen authorities, edited by Gerhard A. Cook of Linde Company. Work was compiled to fill the literature gap on the inert gases. Volume I includes history, occurrence, and physical and chemical properties, nuclear and atomic structures, chemical properties, and liquid and solid state properties. Volume II discusses methods of isolating, purifying, and handling the gases, their uses and methods for the analytical determination of the gases themselves and of their impurities.

Projection Welding

"Projection Welding Low Carbon Steel Using Embossed Projects," 14-page bulletin available from Resistance Welder Manufacturers' Association, 1900 Arch Street, Philadelphia 3, Pa. 50 cents.

Data is given to assist the welding engineer in the selection and operation of projection welding equipment. Bulletin lists advantages of projection welding, describes weld formation, covers the influence of welding variables, and the projection welding of thin and unequal metal thicknesses.

Fire Prevention

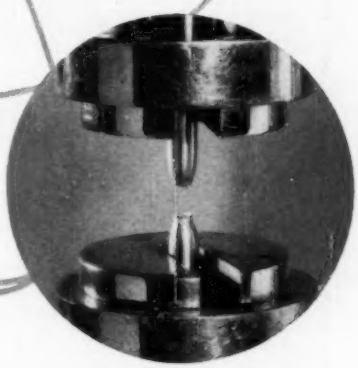
"Welding and Cutting in Garages" National Fire Protection Association, NFPA No. HS-1, 1961, 12 pages. Order from the association, 60 Batterymarch Street, Boston 10, Mass. 50 cents.

This is the first of a series of special hazard studies prepared by the NFPA Fire Record Department. Report tells how to deal with the serious problem of welding and cutting fires in garages. Sixteen percent of garage fires studied were traceable to welding and cutting, and two-thirds of these involved the mishandling of gasoline.

Case histories and photographs of actual fires demonstrate the many hazards connected with welding and cutting operations. Text describes ways to avoid the hazards.

THE TOUCH OF EXPERIENCE

IN WELDING RESEARCH



Experimentation, by specialists in welding electrode development ■ researchers . . . technicians / mixing, extruding, welding and testing in a never ending cycle ■ combining elements to be alloyed in the welding arc to give you the filler metal for tomorrow's welding needs ■ to improve the quality of today's filler metal ■ Experience is the vital ingredient that imparts quality and dependability—these are characteristics of every Alloy Rods Company welding product ■

ALLOY RODS COMPANY

YORK, PENNSYLVANIA

SALES OFFICES AND WAREHOUSES • BOSTON • NEWARK • PHILADELPHIA • PITTSBURGH • BIRMINGHAM
CHICAGO • CLEVELAND • SAN FRANCISCO • EL SEGUNDO, CAL. • DISTRIBUTORS IN ALL OTHER PRINCIPAL CITIES

For More Information Circle No. 8 on Reader Service Card.

BRAZING ALLOY REFERENCE CHART

SILVALOY BRAZING ALLOYS

SILVALOY	NOMINAL COMPOSITIONS					Solidus °F	Liquidus °F	Density troy oz /cu in
	Ag	Cu	Zn	Cd	Other			
5	5	88.75	0	0	P=6.25	1190	1300	4.37
15	15	80	0	0	P=5	1190	1300	4.45
35	35	26	21	18		1125	1295	4.90
45	45	15	16	24		1125	1145	4.92
50	50	15.5	16.5	18		1160	1175	5.00
503	50	15.5	15.5	16	Ni=3	1170	1270	5.00
355	56	22	17	0	Sn=5	1145	1205	5.00
I-401	5	0	16.6	78.4		480	600	4.53
377	5	0	0	95		640	740	4.60
A-4	9	53	38	0		1410	1565	4.50
20	20	45	30	5		1140	1500	4.64
A-11	20	45	35	0		1315	1500	4.68
A-79	25	52.5	22.5	0		1250	1575	4.71
A-13	30	38	32	0		1370	1410	4.67
250	40	30	28	0	Ni=2	1220	1435	4.76
254	40	30	25	0	Ni=5	1220	1580	4.72
A-14	40	36	24	0		1235	1415	4.80
105	45	30	12	0	Mn=13	1298	1298	4.76
A-18	45	30	25	0		1225	1370	4.82
A-25	50	34	16	0		1250	1425	4.99
54	54	40	5	0	Ni=1	1340	1575	5.06
A-33	60	25	15	0		1245	1325	5.02
60	60	30	0	0	Sn=10	1115	1325	5.23
T-50	62.5	32.5	0	0	Ni=5	1435	1590	5.19
Easy	65	20	15	0		1240	1325	5.06
Medium	70	20	10	0		1275	1360	5.14
301	72	28	0	0		1435	1435	5.24
AE-102	72	27.8	0	0	Li=.2	1410	1410	5.22
K-427	75	0	25	0		1300	1345	5.06
T-51	75	24.5	0	0	Ni=.5	1435	1475	5.30
Hard	75	22	3	0		1365	1450	5.28
T-52	77	21	0	0	Ni=2	1435	1525	5.32
A-49	80	16	4	0		1345	1490	5.29
AE-100	92.8	7.0	0	0	Li=0.2	1410	1610	5.46
S-475	95	0	0	0	Al=5	1550	1600	5.73
AT-601	97	0	0	0	Li=3	1115	1235	3.54
AT-600	98	0	0	0	Li=2	1290	1400	4.03

SILVALOY & PRECIOUS METAL ALLOYS

The American Platinum & Silver Division is ready to supply your brazing needs. The alloys listed here are part of the AP&S service. Refer your brazing problems to us for our recommendations, or write to American Platinum & Silver Division directly, or to your local Silvaloy distributor.

Silvaloy compositions include all commercially important silver base alloys and many special purpose compositions. The popular low temperature Silvaloy 35, Silvaloy 45, Silvaloy 15 are included in this group. If other compositions are required they can be supplied on special request.

We Recommend #1200 or Black Flux with Silvaloy Brazing Alloys

Ask for "A Complete Guide to Successful Silver Brazing...."

PRECIOUS METAL BRAZING ALLOYS

ENGALOY PM	NOMINAL COMPOSITIONS					Solidus °F	Liquidus °F	Density troy oz /cu in
	Au	Pd	Ag	Cu	Other			
478		5	68	27		1480	1490	5.31
491		10	58	32		1520	1565	5.30
490		15	65	20		1565	1650	5.45
493		20	52	28		1615	1650	5.41
492		25	54	21		1650	1740	5.51
428		5	95			1780	1850	5.56
431		10	90			1835	1950	5.60
447		20	80			1960	2150	5.67
485		30	70			2120	2250	5.74
238	80			20		1630	1630	8.28
261	75		5	20		1625	1640	7.99
265	72				(Ni=22) (Cr=6)	1785	1835	7.48
242	37.5			62.5		1814	1859	5.90
260	35			65		1832	1870	5.80
243	35			62	Ni=3	1787	1886	5.81
255	82				Ni=18	1742	1742	8.41
129		60			Ni=40	2260	2260	5.58
440		20	75		Mn=5	1830	2050	5.56
441		33	64		Mn=3	2100	2190	5.70

Precious metal compositions provide higher brazing temperatures as may be required for vacuum tube, aircraft, or missile use. These alloys will provide good corrosion resistance and minimum diffusion into base metals. They are ideal for atmosphere brazing.

ENGELHARD
INDUSTRIES, INC.

AMERICAN PLATINUM & SILVER DIVISION
231 NEW JERSEY RAILROAD AVE. • NEWARK 5, NEW JERSEY

SALES OFFICES: SAN FRANCISCO • LOS ANGELES • CHICAGO • NEW YORK
PROVIDENCE • MIAMI • ORLANDO • DALLAS

DISTRIBUTORS LOCATED IN MAJOR CITIES THROUGHOUT THE UNITED STATES AND CANADA

For More Information Circle No. 12 on Reader Service Card.

REFERENCE DATA

catalogs, handbooks, manuals

SPECIALTY PRODUCTS for welding, soldering, and brazing are described in a compact 4½-page handy and authoritative reference by All-State Welding Alloys Co., Inc. Alloy selection charts and convenient product groupings are designed for time-pressed welders.

Circle No. 300 on Reader Service Card.

WELDING WIRES AND RODS are described in Catalog F-1486 available from Linde Company, Division of Union Carbide Corp. It describes the various Oxweld wires for all continuously-fed electrode welding processes. The guide lists available forms, sizes, packages, and chemical compositions.

Circle No. 301 on Reader Service Card.

FABRICATION AND FIELD erection services of Nooter Corporation have been published in a new 36-page brochure. The illustrated booklet gives a behind-the-scenes picture of the wide scope of machinery, tools, materials, techniques, and quality control procedures used in the fabrication of tanks, pressure vessels, and other plate-fabricating equipment.

Circle No. 302 on Reader Service Card.

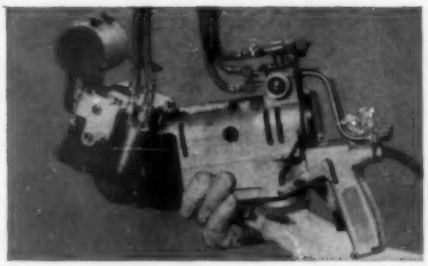
"THE USE OF PORTABLE X-RAY Equipment in Pipeline Construction" is the new Technical Bulletin #6 issued by Balteau Electric Corporation. Included in the illustrated literature is a detailed description of the application of radiography in pipeline construction work along with complete data dealing with actual x-ray techniques employed.

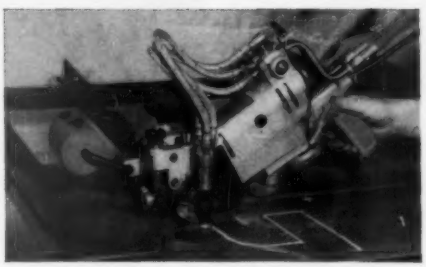
Circle No. 303 on Reader Service Card.

HARDENING COMPOUND for economical hardening of ferrous alloys is described in literature from Precision Chemical Works, Division of Cheker Stamping & Mfg. Corp. Called Hot-Shot, this compound is said to hold scaling and distortion to a minimum, and require lower temperatures than by most methods.

Circle No. 304 on Reader Service Card.

NO CUTTING MACHINE CAN MATCH THE VERSATILITY OF THE PORTABLE LINDE CM-75 "CADET." IT CUTS ACCURATE LINES, BEVELS, CIRCLES, CONTOURS. WEIGHS ONLY 19 LBS. COSTS YOU ONLY $275.*





* FOB Newark, N. J. Comes complete with torch, four 2-piece nozzles, circle cutting attachment, six cleaning drills, two balancing weights, and two wrenches. Only machine of its size equipped with a clutch for instantaneous freewheeling. Uses acetylene, propane, or natural gas. Cuts metal up to 2 in. thick.

UNION CARBIDE

LINDE COMPANY

"Linde" and "Union Carbide" are registered trade marks of Union Carbide Corporation and used by its Division, Linde Company, 270 Park Ave., N.Y., N.Y.

Linde Company, Dept. WD-1, 270 Park Avenue, New York 17, N. Y.

☐ Please send me technical literature on the CM-75.

☐ Please contact me to arrange for a demonstration.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

For More Information Circle No. 70 on Reader Service Card.

TV TAMES GIANT WELDMENTS

New automation techniques put responsibility for precision manufacture of Morgan equipment in the hands of skilled technicians . . . plus exacting, efficient production facilities.

This 135-ton milling and boring machine, for example, handles giant weldments with new speed and ease . . . but maintains the extreme accuracy we demand for all components of Morgan-built equipment. An interesting feature is a television screen that lets the operator read vernier scales on a lower level without leaving the control platform.

Automatic submerged arc welding of girders . . . a 52-foot stress relieving furnace . . . the world's largest flame cutting facilities and other new production facilities contribute to the "extras" you get in today's Morgan-built products. Let our representative help *you* plan for more profitable, continuous-flow production.

Inspection of the Morgan plant is welcomed. Write, wire or phone for complete data on facilities . . . or ask a Morgan sales engineer to call.

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

Overhead electric traveling cranes, gantry cranes, open hearth special cranes, plate mills, blooming mills, structural mills, shears, saws and auxiliary equipment.

For More Information Circle No. 56 on Reader Service Card.

BULK SUPPLY SYSTEMS for gaseous and liquid oxygen, nitrogen, and argon are described and illustrated in a new 24-page booklet (N-155) available from the National Cylinder Gas Division of Chemetron Corporation. Specifications, capacities and space requirements for NCG liquid converters, for tow and tube high pressure gas trailers, and for cylinder bank fill units are included.

Circle No. 305 on Reader Service Card.

WEIGHT SAVING STRENGTH, toughness, and excellent weldability are the three main features of Triple S-100 high strength alloy steel described in literature from its developer, Sheffield Division, Armco Steel Corp. Complete specifications and suggested uses are listed.

Circle No. 61 on Reader Service Card.

INDUSTRIAL GAS DATA in a 48-page, pocket-sized booklet, ADE-890, is now available from Air Reduction Sales Company. Bound in leatherette for durability, booklet lists physical and chemical properties of most common industrial gases. Handy tables provide simple and fast conversion of volumetric measurements.

Circle No. 306 on Reader Service Card.

BEAM CLAMP/CONDUIT HANGERS, a unique design combining both in one unit, are described and illustrated in a catalog published by the Gat Division of Erico Products, Inc. Specifications are listed for each plus a sketch of its proposed use. Special features are listed, including rust resistant coatings.

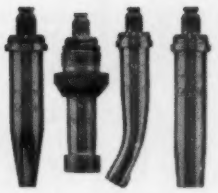
Circle No. 307 on Reader Service Card.

PRECISION RESISTANCE welding power supplies featuring solid state design, dual watt-second ranges and optional voltage regulation, and based on the asymptotic charging principle, is described in a new catalog now available from Unitek Corporation, Weldmatic Division. Catalog 101 offers a table of specifications, cross reference, and criteria for selecting equipment.

Circle No. 308 on Reader Service Card.

Genuine

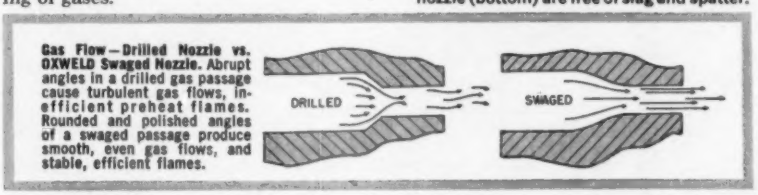
OXWELD NOZZLES



ARE PRECISION-MADE, INDIVIDUALLY FLAME-TESTED TO CUT BETTER AND SERVE YOU LONGER. CHROME-PLATING ALONE BOOSTS LIFE OF NOZZLES OVER 150%*

Slag and spatter adhere to non chrome-plated nozzle (top), clog the preheat orifices. After the same length of service, preheat orifices in a chrome-plated OXWELD nozzle (bottom) are free of slag and spatter.

*Durable, wear-resistant chromium protects OXWELD nozzles from the major causes of replacement. It sheds slag and spatter, resists corrosion and reflects more than 95 per cent of radiant heat. Mixing of gases in the torch—not the nozzle—eliminates flashback and assures thorough mixing of gases.



Gas Flow—Drilled Nozzle vs. OXWELD Swaged Nozzle. Abrupt angles in a drilled gas passage cause turbulent gas flows, inefficient preheat flames. Rounded and polished angles of a swaged passage produce smooth, even gas flows, and stable, efficient flames.

UNION CARBIDE

Call your nearby LINDE Office or Distributor.

LINDE COMPANY

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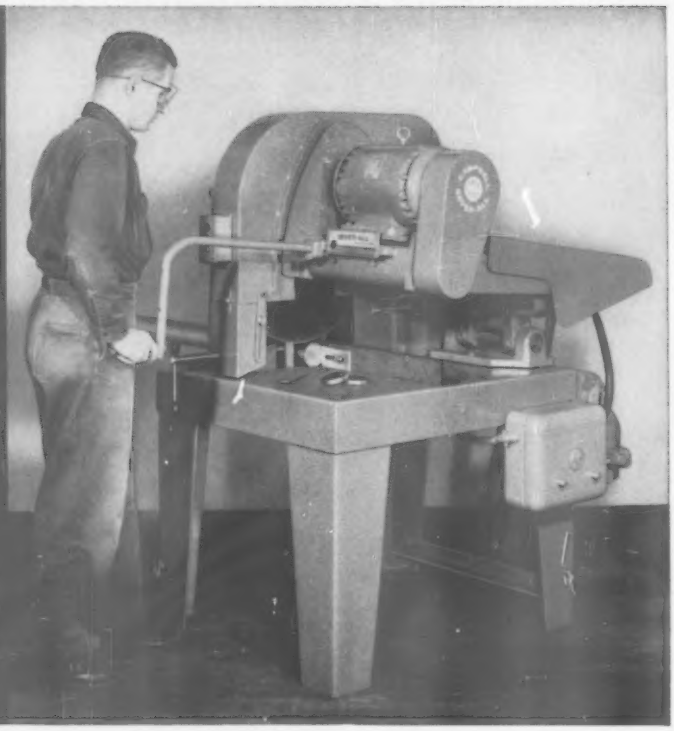
For More Information Circle No. 71 on Reader Service Card.

NEW!

GREATEST CUT-OFF CAPACITY IN ITS CLASS!



• This newest addition to the Sever-All line of abrasive cutting machines—the Model 2-A—provides greater cutting capacity and more flexibility than any other machine in its class. Check these important advantages:

Big capacity • cuts 4″ round or square solids, 6″ diameter tubing or standard pipe, 6″ x 1″ flat stock, 6″ angle iron and 8″ channels. Cuts practically all metals.

Fast operation • accurate cuts at the rate of 2 to 3 seconds per square inch. For instance, you can cut a 4″ bar of hardened steel in 45 seconds, or a 2″ pipe in 3 seconds.

Power oscillation • oscillation—the forward and backward motion of the cutting wheel as it is fed down into the cut—gives you extra cutting capacity without excessive horsepower load on your power lines. It also contributes to longer wheel life and reduced operator fatigue.

Quality cuts • clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting action.

Economy • Sever-All abrasive cutting wheels, developed specially for the Model 2-A, assure you of lowest cost per cut.

Safe • wheel guard provides complete operator protection.

Minimum maintenance • all bearings are the pre-lubricated and sealed type. Clean, simple machine design permits easy housekeeping.

Built to last • rugged machine bed and rigid castings make the Model 2-A first choice for heavy-duty jobs.

VARIETY OF WORK HOLDERS GIVES UNUSUAL VERSATILITY

V-block with quick-action clamp

Angle-cutting work holder

2-way clamp for irregular shapes

Choose the work holders you need from several optional arrangements. These include the vise-type holder shown on the machine at top, plus the V-block, angle-cutting and 2-way clamp fixtures above. All fit interchangeably on the Model 2-A Sever-All. Screw-type and quick-action clamping also may be used interchangeably.

***Write for details** on the new Model 2-A Sever-All abrasive cutting machine. Ask for Bulletin DH-299*

ACCO

SEVER-ALL ABRASIVE CUTTING MACHINES

Allison-Campbell Division, American Chain & Cable Company, Inc.

925 Connecticut Avenue, Bridgeport 2, Conn.

For More Information Circle No. 7 on Reader Service Card.

TUNGSTEN CARBIDE hard-surfacing Sprayweld powder, Colmonoy No. 75, is described in a new 8½x11 two-page illustrated two-color Technical Data Sheet (No. T-5) available from Wall Colmonoy Corporation. The new literature discusses properties and applications of Colmonoy No. 75 and gives recommendations for its use in overlaying a variety of base metals.

Circle No. 309 on Reader Service Card.

"THE ROLE OF MOLYBDENUM and Copper in Corrosion Resistant Steels and Alloys" is a new 60-page booklet published by Climax Molybdenum Company, a division of American Metal Climax, Inc. Numerous tables, charts, graphs, and photographs describe in detail the rapid development of corrosion resistant steels.

Circle No. 310 on Reader Service Card.

SAFETY-ENGINEERED distribution system to supply power to electrical resistance strip heaters for preheat and stress relief in welding is described in a data sheet issued by J. B. Nottingham & Co., Inc. Specifications, drawings, and photos completely describe the quickly installed "Duraline" plug-in equipment.

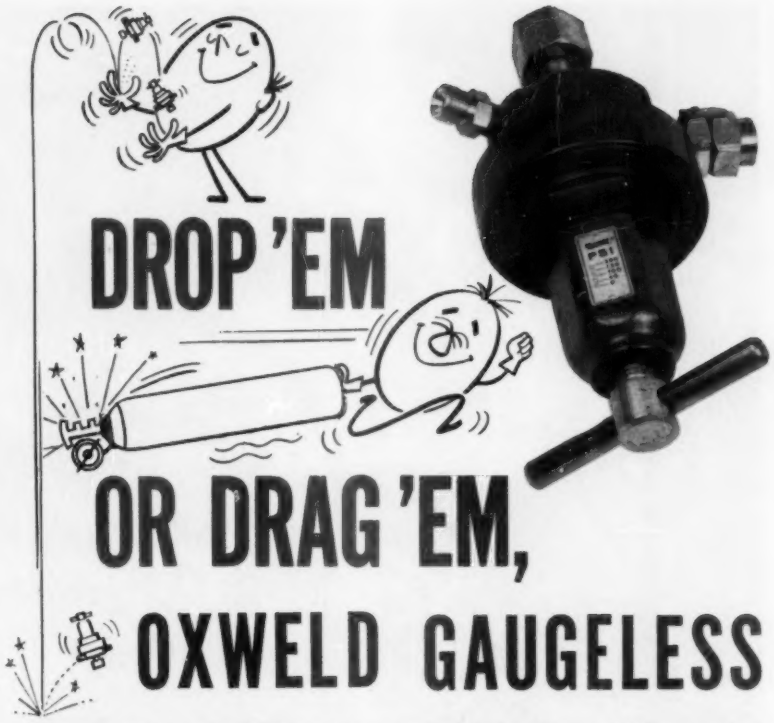
Circle No. 311 on Reader Service Card.

CERTIFIED SELENIUM cells and stacks, and cartridge type selenium rectifiers are described in a new bulletin published by the Semiconductor Division of Syntron Company. Illustrated in color, Bulletin 400 includes cutaway drawings showing features of its selenium rectifiers.

Circle No. 312 on Reader Service Card.

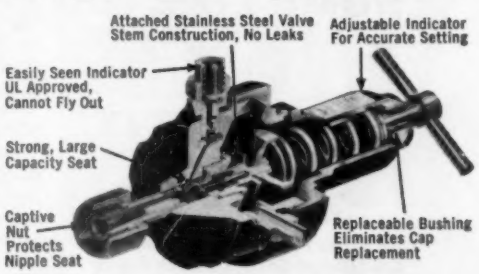
METALWORKING AND MATERIAL handling equipment of 3,800 types and models available from nation-wide distributor is listed in a new 12-page brochure available from Joseph T. Ryerson & Son, Inc. Bulletin 90-6 illustrates and briefly describes the principal units according to kind of work performed.

Circle No. 313 on Reader Service Card.



DROP 'EM OR DRAG 'EM, OXWELD GAUGELESS REGULATORS STAND UP TO WORST ABUSE, ARE MADE SO SIMPLY YOU CAN REPLACE THE ENTIRE VALVE ASSEMBLY FOR ONLY 23 DIMES!*

*Stem, $1.00; seat, $.90; spring, $.40. Forged brass bodies are non-porous with no gas leakage. Service life is maximum, maintenance minimum. There are models of OXWELD gaugeless regulators for use with oxygen, acetylene, propane, nitrogen and hydrogen for cylinder, manifold or station service.


Attached Stainless Steel Valve Stem Construction, No Leaks
Adjustable Indicator For Accurate Setting
Easily Seen Indicator UL Approved, Cannot Fly Out
Strong, Large Capacity Seat
Captive Nut Protects Nipple Seat
Replaceable Bushing Eliminates Cap Replacement

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Call your nearby LINDE Office or Distributor.

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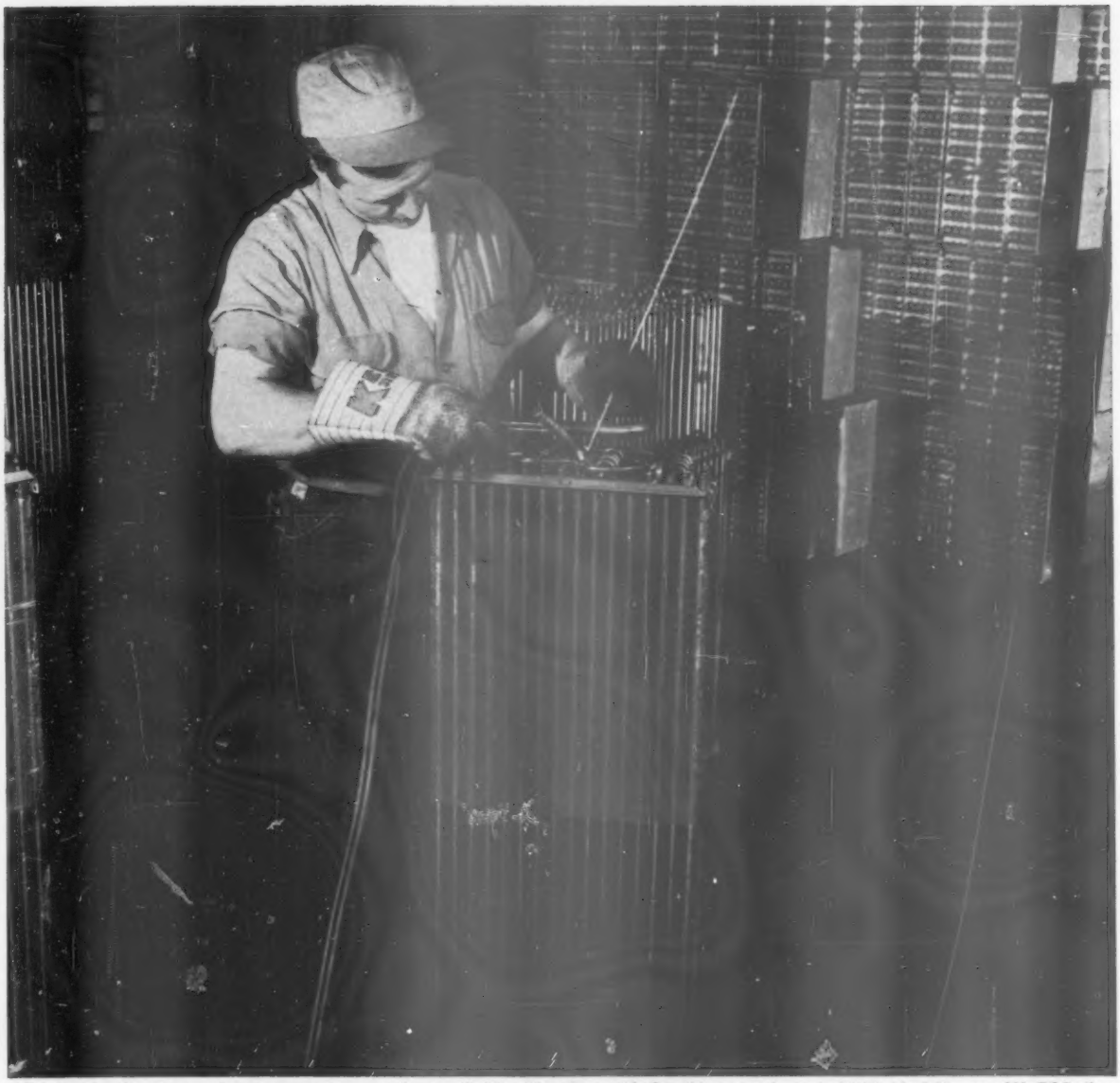
For More Information Circle No. 72 on Reader Service Card.



All return bends and many intercomponent connections on Fedders Heat Pump Air Conditioner are brazed with Handy & Harman SIL-FOS alloy.

SOME LIKE IT HOT SOME LIKE IT COLD

Versatile Fedders Heat Pump Air Conditioner Satisfies Both Needs According to Season...Brazed with SIL-FOS for Compactness, Strength and Reliability

This workman is assembling one of the most versatile temperature-conditioning devices ever made—the Fedders Adaptomatic heat pump air conditioner.

Utilizing the same thermodynamic principle to either cool the environment during the summer or heat it in winter, the Adaptomatic finds use in a wide variety of commercial and industrial structures for its space-saving compactness, low operating cost and its ease and economy of installation.

This machine packs a lot of heating and cooling power into remarkably small space, thanks to a number of ingenious design features. Thanks, too, to silver brazing. By making full use of Handy & Harman SIL-FOS in brazing the dozens of copper-to-copper joints in compressor, evaporator and condenser, and in joining major components, Fedders gives parts strength without bulk...gets leak-tight, ductile joints that withstand jars, vibration and thermal changes...makes every cubic inch count for the job it has to do.

The Handy & Harman family of brazing alloys and fluxes have a way of bringing out the best in any design—while saving production dollars. If you're not already familiar with them, our Bulletin 20 provides an extremely useful introduction. It's yours for the asking.

HANDY & HARMAN
850 Third Avenue, New York 22, N.Y.

For More Information Circle No. 34 on Reader Service Card.

"HOW TO HEAT TREAT Armco 17-4 PH stainless steel," is a new data folder from Armco Division of Armco Steel Corporation. The folder is in handy wall chart form and is especially useful to heat treaters and other subcontractors working with this precipitation-hardening stainless steel grade.

Circle No. 314 on Reader Service Card.

MATERIAL HANDLING devices are listed in a new, handy six-page two-color fold-out brochure available from Merrill Brothers. It is a condensed version of their standard Catalog C-3; describes fully their broad line of clamps.

Circle No. 46 on Reader Service Card.

KNUCKLE JOINT PRESSES are described in a new 12-page brochure, No. 52400, available from Federal-Warco Division, The McKay Machine Company. The brochure illustrates and describes presses from 100 to 2500 ton capacities. It lists such uses as coining, extruding, cold forming, sizing, swagging, heading, and embossing.

Circle No. 315 on Reader Service Card.

WELDING AND CUTTING torches and accessories are listed in a catalog available from Modern Engineering Company. Regulators of all types are also listed. All specifications and operating characteristics are given in complete detail.

Circle No. 54 on Reader Service Card.

STANDARD AND CUSTOM engineered power supplies, ranging in size from 50 watts to 5,000 kilowatts, are covered in a 44-page catalog just released by American Rectifier Corporation. Over 3,000 models are listed and described in this well-illustrated catalog. Special features include a glossary covering terms used most frequently in power supplies, a basic power supply and control feature evaluation chart, and an electroplating guide.

Circle No. 316 on Reader Service Card.

NEW–OXWELD C-66 TORCH CUTS 30-IN. METAL IN ONE PASS–OPERATES ON NATURAL GAS, BUTANE, PROPANE. YOU CAN SLASH CUTTING COSTS 15% OR MORE BECAUSE OF FASTER STARTS AND TREMENDOUS PRE-HEAT CAPACITY*

* As proven in actual competitive tests—compared with other cutting torches. Tremendous preheat capacity and gas flows (up to 300 cfh natural gas and 3,000 cfh oxygen) enable C-66 to start faster and cut quicker than any other torch on the market. Use it for *all* flame-cutting from thin sheet metal to largest risers. Four interchangeable injectors make the C-66 adaptable to all fuel gas pressures from sub-atmospheric to 20 psi.

The C-66 is available in 28 combinations of lengths and head angles. Longer models such as 42-inch model shown here are ideal for riser removal.

UNION CARBIDE

Call your nearby LINDE Office or Distributor.

LINDE COMPANY

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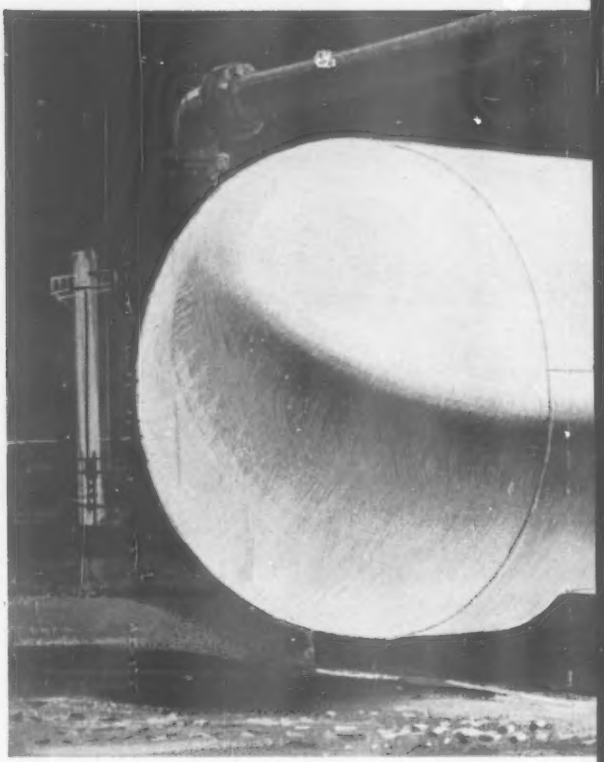
For More Information Circle No. 73 on Reader Service Card.

SSS 100 ALLOY STEEL

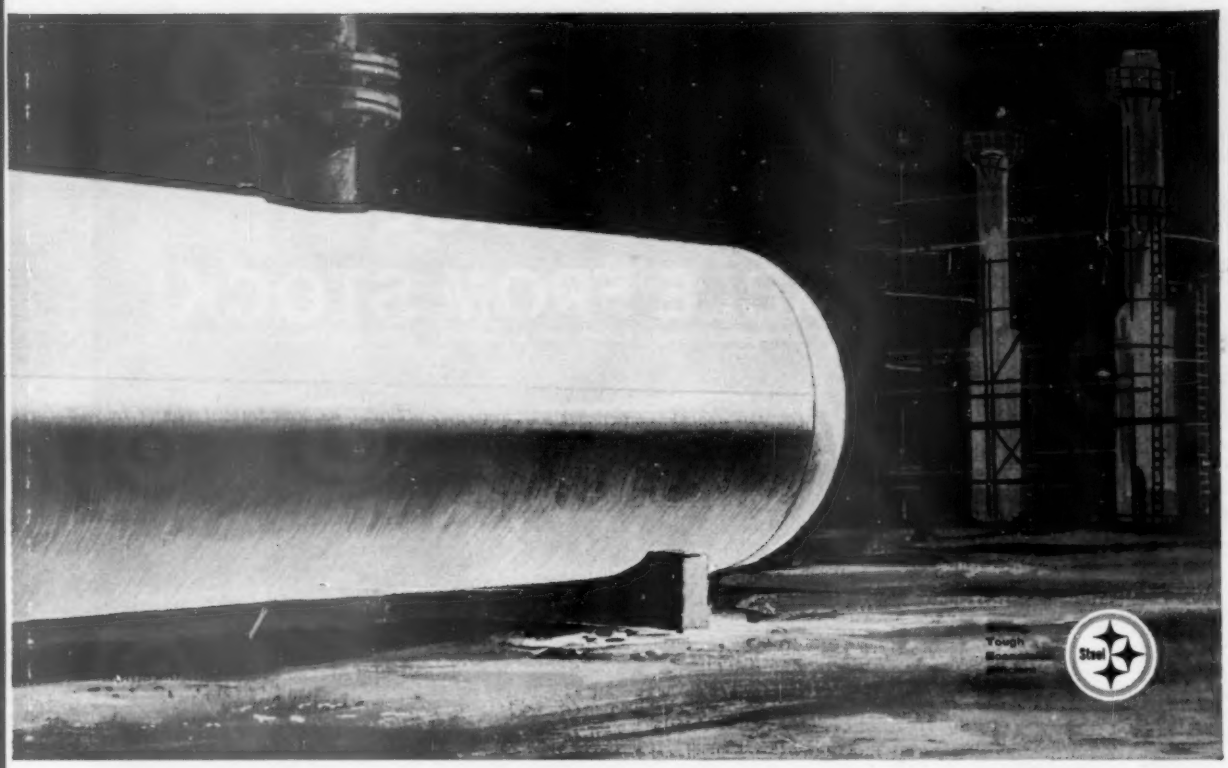


A.S.M.E. Approved

SSS-100 is approved for use in the construction of welded pressure vessels according to the requirements of Section VIII of the ASME Boiler & Pressure Vessel Code (Case No. 1298—Special Ruling).

Sheffield's New SSS-100 Meets

(Triple S-100)



Growing Need For Tougher Steel

Quenched and Tempered Alloy Constructional Steel With New Weight-Saving Strength—Greater Durability Under Punishing Loads—Excellent Weldability for Easier Fabrication.

Here it is! Sheffield's answer to the challenging need for steel with new qualities to meet the pressures of today's construction:

New Sheffield SSS-100	
Tensile Strength	115,000 psi minimum
Yield Strength	100,000 psi minimum
Elongation (in 2 inches)	18% minimum
Reduction in Area	50% minimum

SSS-100 may be furnished to requirements of ASTM A-300 at –50°F in firebox or higher quality levels.

SSS-100 is the steel to specify—to demand—for storage tanks and pressure vessels, bridges, earth movers, heavy construction machinery, transport equipment, tank trucks, TV towers, fabricated structural shapes, missile ground-support equipment—any application that calls for a versatile combination of high strength, toughness and excellent weldability.

Sheffield SSS-100 is available in plates from $\frac{3}{16}$ to 2 inches thick, in blooms and billets for forging and subsequent heat treatment. Heat-treated bars can be furnished on inquiry. Also supplied heat treated to 321 minimum Brinell for use where resistance to impact abrasion is required.

For complete information and technical service, write **Sheffield Division, Armco Steel Corporation, Attention Alloy Sales, P. O. Box 3129, Houston 1, Texas.**

ARMCO Sheffield Division

For More Information Circle No. 61 on Reader Service Card.

32,000 VARIATIONS OF WELDER CONTROL AVAILABLE FROM STOCK!

Square D "Building-Block" Construction means fast delivery of the Control you need

• When you need welder control—for any welding function—Square D can give you what you want, when you want it. More than 32,000 combinations of enclosures and plug-in panels can be made up from off-the-shelf stock to meet your exact requirements. The result—your control is made to order, thoroughly checked and tested, and shipped without delay. Similar facilities exist in warehouses from coast to coast, and warehouse stocks of plug-in panels are also available to assist Square D field engineers in on-the-spot service. • Square D plug-in construction lets you add control functions as you need them. Panels perform all NEMA standard functions, with either tube or relay firing, including heat, slope, current regulator, dual functions, forge and anti-repeat initiation. All NEMA standard enclosures are available, with or without disconnect switch, as well as enclosures to meet IIC specifications or your own special requirements. You can get the welder control you need from Square D—quickly!

Write for details. *For the complete story on Square D welder control, write for Bulletin SM-277. Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin*

SQUARE D COMPANY

—wherever electricity is distributed and controlled

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DECEMBER, 1961

Welding Design & Fabrication

ESTABLISHED IN 1930 AS INDUSTRY & WELDING

SPECIAL REPORT

Semi-automatic welding fights rising industry costs

FAST, HIGH QUALITY welding and surfacing.

That's the job semi-automatic welding is doing for cost-conscious American industry.

Semi-automatic welding has made great strides in the last few years. Experts continue to predict that semi-automatic welding will replace more and more manual welding. The more optimistic even say it will replace 50 percent of the welding now being done manually. You can agree or disagree with that figure, but it does give some idea as to the potential for the different semi-automatic processes.

This report outlines the features of each of the 8 different processes, giving latest developments in each.

An equipment selection guide appears on pages 36-37, a trade name index on page 38, and cost-cutting case histories on page 39.

SUBMERGED ARC WELDING

How it works: The operator fills the flux hopper, points the welding gun into the joint, allows a pile of granular flux to accumulate, and strikes an arc under the flux with the electrode. Once the arc is struck, the electrode mechanically feeds into the gun as the operator moves it along the work. The feeding mechanism maintains a constant arc length by controlling wire feed speed. Flux shields the arc and molten metal and acts as a scavenger.

Equipment: Continuous wire electrode (5/64-, 3/32-, and 7/64-inch-diameter) is fed through the center of the cable which also carries the welding current. Power is supplied by conventional welding machines (preferably a d.c. machine of 300 to 600 amps). Reverse polarity is most common.

Developments: Mechanized equipment now available automatically feeds both wire and flux to the weld. The hand-held gun being motor-driven along the seam at a preset speed (up to 50 ipm) develops the speed and uniform weld appearance characteristic of full automatic welding, yet retains the mobility and flexibility of semi-automatic equipment.

Another development is the use of alloying fluxes. These contribute alloying elements to the weld deposits, giving the weld or overlay suitable properties.

INERT GAS-SHIELDED WELDING

How it works: Consumable electrode is fed continuously through a welding gun from a wire reel. Electrode, arc and weld puddle are protected by inert shielding gas.

Equipment: Electrodes range in diameter from about .030- to 1/8-inch. Welding guns (air- or water-cooled) and feeding mechanisms may be push-type for thick wire or pull-type for thinner diameters. Power source is up to 600 amps D.C., constant voltage or constant potential. Shielding gas is helium, argon, or a combination of these.

Developments: Newest developments make possible welding metal as thin as 24-gage. See the section on "*Fine Wire Welding*" on page 37 for complete details.

CO_2 GAS-SHIELDED WELDING

How it works: This process operates much the same as inert gas-shielded welding.

Equipment: Equipment, including welding guns and feed mechanisms, are similar to those used in inert gas-shielded welding, except that a CO_2 shielding gas is used along with steel welding wire to produce welds on a variety of steels. D.C. power sources can be constant potential or constant voltage, up to 650 amps.

Developments: New equipment makes possible welding thin sections of steel down to 24-gage. See the

Use this guide in selecting

	Submerged Arc	Inert Arc	CO_2	CO_2 (flux coated)
Principal Applications	For welding mild, alloy, and stainless steels, 16 gage and thicker; for surfacing.	For all weldable metals, including aluminum, copper, stainless steel, titanium, cast iron, high-temperature alloys and hard-to-weld metals. For depositing aluminum-bronze, stainless, or copper on mild steel. For 12-gage and thicker.	For welding low and medium carbon, low-alloy high-tensile, and high strength steels, and some stainless steel grades. For 10-gage and thicker.	For welding carbon steels.
Advantages	High deposition rate and welding speed. Good penetration. Flat contoured bead has excellent appearance. Low hydrogen deposits of X-ray quality. Combination of wires and fluxes gives variety of weld chemistry. Easy slag removal. Little plate preparation. Minimum grinding or finishing. Spatter-free welds. Hidden arc.	High heat permits fast, all-position welding on metals 1/8" and thicker. Little distortion. High production; high-operator factor. X-ray quality welds. Convex, good looking welds. No weld cleaning. Visible arc.	Visible arc. High deposition rate; low cost per lb. of weld. High operator factor. Inexpensive shielding gas. Deep penetration reduces weld size and amount of filler wire required; smaller bevels on plate; little distortion. No slag cleaning. X-ray quality, smooth welds. Wide range of thicknesses can be welded; no limitation to number of passes with proper wire.	High quality welds at high speeds. High deposition rate. Visible arc. Unaffected by moderate amounts of rust, scale, dirt or moisture. Little operator training needed. For all-position welding. Good for poor fit-up. Little tendency for undercutting. Good bead appearance.
Limitations	For flat and horizontal welding. Hidden arc. Flux feeding, removing, and reclaiming. Possible flux entrapment.	Not used on metals under 1/8" thick. Wire and gas costs relatively high. Equipment is bulkier than Tig. Some spatter.	Deep penetration is not good on thin sections or poor fit-up. Some spatter. Limited to flat and horizontal position. Slightly more operator training. Bead not as smooth as with tubular wire or submerged arc. Narrow weld bead requires good tracking.	Wire cost higher than solid CO_2 wire. Slag removal.

section on "*Fine Wire Welding*" on page 37 for complete details.

CO_2-FLUX COATED ELECTRODE

How it works: This process uses a continuously-fed coiled wire electrode that is magnetically-coated with flux and shielded by carbon dioxide gas.

Equipment: Basic equipment includes an air-cooled welding torch rated 450 amps continuous duty which acts as the medium for transferring welding power, controlling gas and flux flow, regulating the wire feed speed and welding amperage.

Welding current varies from 125 to 450 amps, DC reverse polarity, while using welding wire from 3/64- to 3/32-inch-diameter.

Developments: New, portable machine that is 300 lbs. lighter and uses 50 percent less space; refined flux that increases metal deposition rates; and improved longer wearing equipment.

CO_2-FLUX CORED ELECTRODE

How it works: A continuous flux-cored electrode

semi-automatic welding equipment

CO_2 (flux cored)	Fine Wire	Vapor Shield	Open Arc
For welding mild, low alloy, high tensile steel fabrications; casting repair. 10-gage and thicker.	For welding thin steel from 1/4" down to 24 gage. Pipe welding; stringer beads without backup, and complete pipe joints. Welding and buildup of low and medium carbon steel, low-alloy high-strength steels and some stainless.	High production welding on wide variety of steel fabrications; filler and lap welds.	For hardsurfacing and build up work and plate fabrication.
High deposition rates and efficiency. Smooth, dense, convex welds. Thin easy-to-remove slag. Very good penetration. Multiple-pass welding. Visible arc. Capacity to handle high currents. CO_2 is low cost. Quiet, spray-type arc with little spatter. X-ray quality welds.	All-position welding. High deposition speed and high operating factor. Good appearance. Visible arc. No limitation to number of passes with proper wire. Low hydrogen-, X-ray-quality welds. Good where fit-up is poor (up to twice metal thickness). No weld cleaning. Minimum operator training.	High deposition rate and high welding speed. Duplicates performance of manual metallic arc welding. High quality welds on rusty metals. No separate flux or gas required. Visible arc. Little operator training. Can be used with poor fit-up.	High speed. Good penetration. Good bead appearance. Simple equipment. High hardness and smooth weld. Visible arc.
Only flat and horizontal welding. Not used on metal under 1/8" thick unless backed-up. Wire cost higher than solid CO_2 wire. Flux absorbs moisture. Slag removal.	Too slow on large plate fabrication. Uneconomical in heavy thicknesses. Some spatter.	Limited to single pass applications. For downhand welding only.	Lower quality weld. Flat welding position. Not for thin metal.

(5/64- to 1/8-inch-diameter) is fed through air- or water-cooled gun to the welding arc. At the same time, both the arc and weld zone are blanketed by CO_2 gas fed through the gun. Flux adds certain alloys to the deposited metal, contains deoxidizing agents, and slag-forming materials. CO_2 gas shields the arc zone and helps purify weld metal.

Equipment: Besides electrodes, shielding gas, and welding gun, equipment consists of motor-driven wire dispenser and control unit, and 500 to 750 amp constant voltage DC welder.

FINE WIRE WELDING

This is one of the new semi-automatic processes.

How it works: Operates similarly to inert gas-shielded or CO_2 gas-shielded processes, except that it uses extremely small electrodes (.020- to 1/16-inch-diameter), extremely low current (up to 300 amps), and low voltages to permit all-position welding of light gage metals (down to 24-gage) even with poor fit-up.

Equipment: Uses wire feed unit and pistol-type or straight-through welding guns. Small diameter steel

TRADE NAME INDEX . . .

COMPANY	SUBMERGED ARC	INERT GAS	CO_2	CO_2 FLUX COATED	CO_2 FLUX-CORED	FINE WIRE	VAPOR SHIELDED	OPEN ARC
Air Reduction Sales Co. 150 East 42nd Street New York 17, New York		Aircomatic	Aircomatic (CO_2 Shielded Arc) Spray Arc			Aircomatic Dip Transfer		
Alloy Rods Company P.O. Box 1828 York, Pennsylvania								Wear-O-Matic
Arcos Corporation 1500 South 50th Street Philadelphia 43, Penna.					Arcosarc			
Auto Arc-Weld Mfg. Company 9615 Meech Avenue Cleveland 5, Ohio	MagnaWelder; Reactor Feed Welder	Reactor Feed Welder	Magna Welder; Reactor Feed Welder			Reactor Feed Welder		
Hobart Brothers Company Hobart Square Troy, Ohio	Manumatic	Multi-Wire Package	Multi-Wire Package		Multi-Wire Package (FabCo-Wire)	Micro-Wire		Manumatic
Lincoln Electric Company 22801 St. Clair Avenue Cleveland 17, Ohio	Manual Lincoln-weld Squirt Welder; Mechanized Squirt Welder						Innershield	
Linde Company, Division of Union Carbide Corporation 270 Park Avenue New York 17, New York	Unionmelt	Sigma: Sigmatic; Sigmatic		Union Arc		Short Arc		
National Cylinder Gas Div., Chemetron Corporation 840 N. Michigan Ave. Chicago 11, Illinois		Argon Arc			Dual Shield	Mini-Arc		
A. O. Smith Corporation 3533 N. 27th Street Milwaukee 1, Wisconsin			C-O Manual			C-O Manual		
Stoody Company 11982 E. Slauson Blvd. Whittier, California								Magna Welder
Victor Equipment Company 844 Folsom Street San Francisco 7, Calif.	Victormatic							Victormatic
Westing-Arc Department, Westinghouse Electric Corporation 4454 Genesee St., Box 2025, Buffalo 5, New York	Westing-Arc	Westing-Arc	Westing-Arc			Westing-Arc		

wire is used with CO_2 or CO_2-argon mixture for light gage steel, while argon, helium, or argon-helium mixtures are used on alloy steels, stainless, and aluminum. Welding is done with DC constant potential welders or DC constant or variable voltage welders.

VAPOR-SHIELDED WELDING

This is another new semi-automatic process.

How it works: A self-sufficient tubular-cored electrode provides filler metal, arc shielding, deoxidizers, and other fluxing agents. No separate gas shielding or flux is required. The mild steel sheath contains the core ingredients and supplies the weld metal.

Core ingredients, ionized by the intense heat at the tip of the welding electrode, expand until they reach the cooler atmosphere surrounding the arc. Here, they condense to form an efficient, dense, conical arc shield that blankets both arc and the molten weld crater.

Equipment: Includes wire feed mechanism, wire reel, input and output cables, gun, and controls. Welding current and control power is furnished by DC motor generator welder with 0 to 875 amps current range and having slightly rising output characteristics to compensate for voltage drop in leads. Result is constant potential characteristics at the arc.

OPEN ARC WELDING

How it works: A wire feed unit feeds a continuous electrode wire through a flexible cable to the welding gun or nozzle. Welds are made without shielding gas or flux.

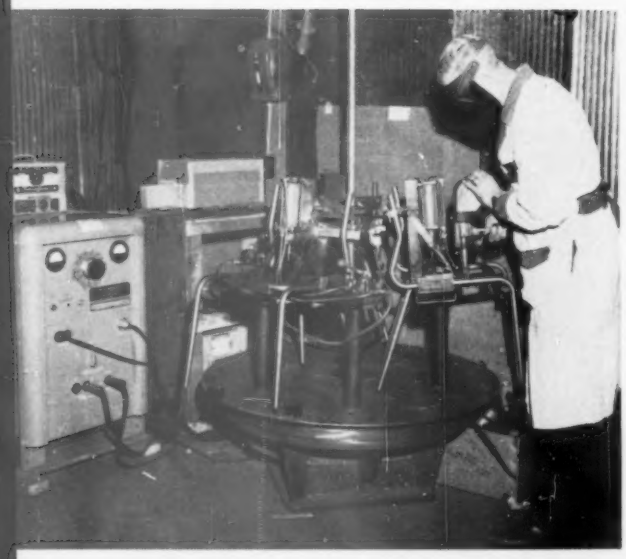
Equipment: Solid or fabricated tubular wire electrodes are available in a wide range of alloys for hard surfacing, building up, and welding. Power for both the welding arc and wire feed unit is furnished by conventional DC welding machine of sufficient capacity (usually 300 amps or more). • •

Semi-automatic welding processes at work...

PRODUCTION WAS DOUBLED and costs cut when Hibben and Company, Chicago, began to use Lincoln Electric Company's Innershield Squirt Welder. This new semi-mechanized vapor shielded arc welding method increased production of 229 blast furnace cooling system boxes from 5½ to over 11 a day. Work crew and production facilities were the same. Only the weld method was changed.

In this application, involving deposition of 19½ feet of 5/16 inch laps and fillets on the five pretacked, ⅞ inch plate members of the cooling box, current averaged 500 amps dc positive at 32 arc volts. Travel speeds was 18 ipm. Fit-up was not critical.

Key to the process is a tubular mild steel electrode wire. It contains material for shielding, fluxing, and deoxidizing. • •



THREE-A-MINUTE is the rate at which chair frames are welded on this 3-position, rotating fixture at Queen City Dinettes Corp., Cincinnati. Six welds are made on each chair by the operator who stands in one position. When semi-automatic Westinghouse equipment replaced stick electrodes, production was tripled and welding costs cut 87.5 percent.

Equipment includes the RCV dc welder, a 200-ampere machine with built-in dynamic reactor, CVAS Westing-Arc control with timer, and SP3 Westing-Gun driving .035 MS21 wire in a 98 argon-2 oxygen shielding gas mixture. • •

HARD SURFACING 40-inch rolls on a Cedar Rapids roll crusher is done using Alloy Rods Company's Wear-O-Matic Model C wire feed unit and 7/64-inch Wear-O-Matic nickel manganese wire. Henry Enge, quarry foreman for Quarry Products, Inc., Richmond, Calif., says, "The Wear-O-Matic wire feed unit on this application saved 50 percent in labor over the manual electrode method we formerly used. The Wear-O-Matic 15 wire costs less and the wear resistance of the deposit appears to be better." • •

more case histories follow . . .

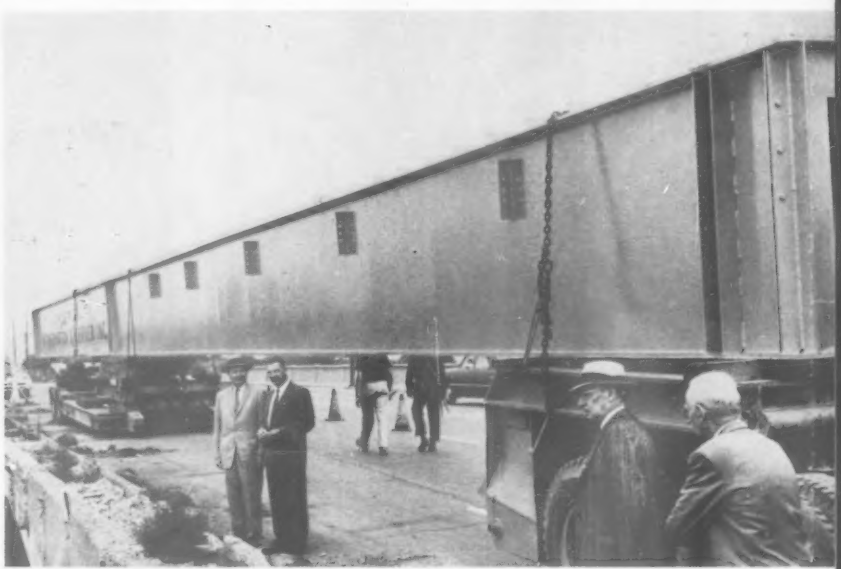
CONSTRUCTION OF A UNIQUE tapered aluminum storage tank was completed three times faster by Nooter Corp., St. Louis, which did the welding with 6 of Air Reduction's Aircomatic pull guns.

The bottom course of the concave tank body is made up of 20 plates, 132½ inches wide, 240 inches long, and tapered lengthwise from 1 inch to .630 inch. The middle course is made of the same size plate but tapers lengthwise from .630 to .250. On the top course, 10 conventional plates, .250 inches thick, 96 inches wide, and 264½ inches long were used. The tapered aluminum panels form heavy walls at the tank's bottom where pressure is greater and progressively thinner walls toward the top. At full capacity, the tank is 70 feet in diameter and 48 feet high. It holds 7,700 tons of ammonium nitrate fertilizer.

Tapered aluminum was used because it resists corrosion and eliminates metal where it isn't needed—the new tank weighs 7,200 pounds less than a conventional one. Tapered plate is erected in larger, vertical panels instead of in horizontal panels—fewer panels mean less welding and handling.

Overall welding costs were less than with conventional design. Faster welding is possible because speed can be increased as the plate thickness decreases.

A total of 124,000 pounds of aluminum plate and structurals were used. • •



THIS 55-TON ALL-WELDED box girder is the backbone of a widened Oliver Street Bridge over the White River in Indianapolis. Trucked from the fabrication shop of Hetherington & Berner only 200 yards away, it is here about to be lowered onto the foundation piers.

It is 127-feet-long, 5 feet in depth, with 48 inch flanges and internal open diaphragms every 5 feet.

To form an expanding Y-approach, a welded plate girder angles in at 38½° and is attached to the box girder near its center. Between the two are positioned wide-flange floor beams, bolted to the welded hanger plates seen on the girder web. Channel section shear connectors are welded every 24 inches to the top flange of the girder to anchor the concrete roadway slabs. The plate girder is 103 feet long, has 18 inch flanges, with 60 inch web.

Most of the welding was done by the submerged arc process, using Lincoln Electric's ML-3 mechanized Squirt welding guns. • •

A LIGHTER, STRONGER product at 15 percent lower cost is what Geerpres Wringer, Inc., Muskegon, Mich., got by integrating Linde Company's Short Arc welding process into its design for a new mop wringer.

Mop wringer side and bottom sections are cut from 14 gage mild steel and formed to shape on a die-punching machine. These preformed parts are assembled in a welding jig. Two supporting steel bars, ¼ inch in diameter, are passed through holes in the center of the side sections, to extend ⅛ inch on each side.

Short Arc welding at 40 ipm joins the bar extensions to the sides. The ST-2 torch operates at 110 amps, 18½ volts, using Oxweld 66 wire, .030 inch in diameter. In similar fashion, a perforated crosspiece is welded to the base of the frame. Only 8 inches of welds are needed for each wringer frame.

Steel tubing is then spray-arc welded (at 190 amps) to a ½ inch steel bar, which is inserted through holes in the side sections. A gear section, which activates the wringer when depressed, is welded to a protruding end of the bar. A semi-circular steel strap, 1 by ⅛ inch is then welded to the bottom of the frame for support, and to balance the base of the frame against tipping.

Each wringer contains 14 inches of welds. • •

CO_2-FINE WIRE WELDING is used on bucket elevator chutes at the Duplex Mill and Manufacturing Co., Springfield, Ohio. All joints are welded solid to prevent loss of material and guard against dust and weather.

Changing from mild steel electrodes to Hobart Brothers Company's Micro-Wire welding process increased production 40 percent and eliminated distortion problems where standard sections must line-up for butting together.

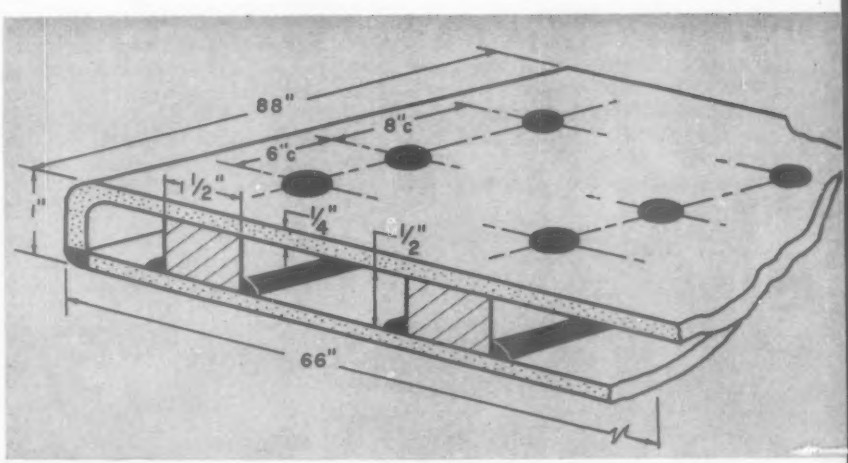
more case histories follow . . .

AUTOMATE the production of auto frame parts at A. O. Smith's Milwaukee Automotive Division. That's the job for this treadmill welding operation. Moving the welder from left to right past the workpiece on a conveyor-like belt, or treadmill, improves weld quality by keeping contact tube height, wire feed, and amperage constant. Welding speed has increased and operator fatigue has decreased. A. O. Smith C-OManual welding apparatus is used. Wire is fed from drive units located above the operator's head.

PLUG WELDING shelves for vacuum dryers with coated electrodes used to take 78 seconds per weld at Buflovak Equipment Div., Blaw-Knox Co., Buffalo. These steel shelves have anywhere from 117 to 336 plug welds that must be leak-proof to contain 360°F steam.

Buflovak used to drill 1-inch diameter holes to get welding room needed to get good fusion at the root. Quality was not consistent.

They cut welding time 94 percent to 4 seconds by switching to semi-automatic CO_2 welding with a flux-cored electrode (National Cylinder Gas' Dual-Shield process). The 1-inch holes were reduced to $\frac{5}{8}$-inch and are punched instead of drilled. Weld quality is more consistent.



TWO SHIPS in the Moore-McCormack Lines fleet are equipped with all-welded aluminum deck houses and stacks. Welding of the 30-ton deck houses was done semi-automatically at Todd Shipyards, using the metallic-inert-gas-shielded-arc process with Alumar 5356 wire supplied by Arcos Corporation. Type 5052-H32 and Type 5083-H112 alloys were welded.

Use of aluminum offered three major advantages: (1) a 3-to-1 weight savings over steel results in increased payloads; (2) center of gravity is lowered, improving stability; and (3) welding time is one-third that needed for steel.

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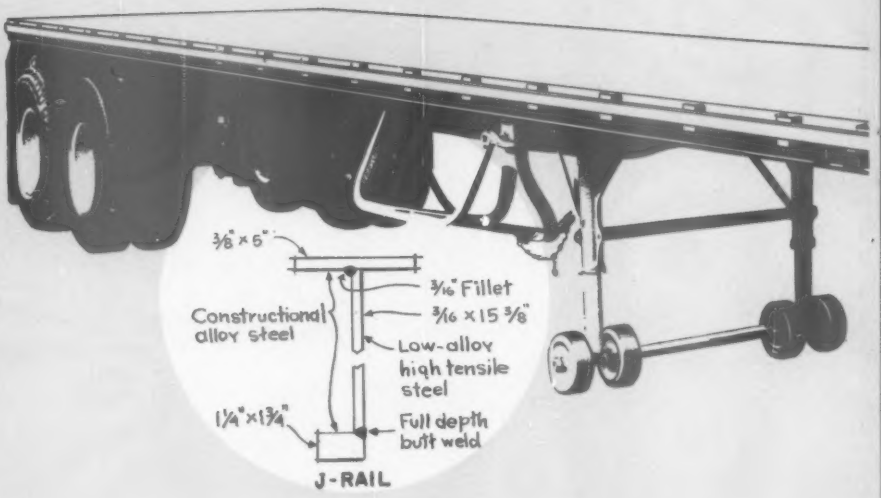
DESIGNER'S NEW MEDIUM: THE HYBRID BEAM

The hybrid beam is a new development that uses metals where they will do the most good. Trailmobile is one of the first to use hybrid beams on trailers. Here's the thinking behind it: Beams of one metal are usually understressed near their neutral axis (the web). So it's sensible to make the flanges of high strength, elastic material, the webs of a weaker metal. Flanges of the heat-treated alloy steel, like Trailmobile uses for J-rails, remain elastic up to 90,000 psi, the web of low-alloy high-tensile steel up to 50,000 psi. This is well within the rated load of the trailer.



High-strength steels mean big

IN BRIEF: This company naturally turned to high-strength steel to lighten trailers. The new capacity, and an unusual beam, has truckers talking.

TRUCKERS GET PAID for what they haul, not for how much trailer metal they move. They want the biggest loads their rigs and roads will stand.

Trailmobile, Inc. is tuned to the trucker. In Cincinnati it makes a flatbed steel trailer that rivals the lightness of an aluminum flat, yet retains the strength of steel. A 35-footer is capable of hauling a distributed load of 50,000 pounds. This is thousands of pounds more than old models could haul.

Trailmobile's trailers are light and strong because of the metal in them and the way it's used. For example, high-strength steel lightens a 35-foot trailer 1,500 pounds. A new main frame member, the J-rail, makes full use of the strength of high-strength steels. And with automatic submerged arc the company eliminated the costly old ways of making members.

When trailers were heavier and payloads lighter, Trailmobile used structural carbon steel I-beams for the main rails. They were strong but overweight, from a trucker's point of view. Tapering the beams was costly and slow, demanding manual and machine flame cutting, torch heating, sledge bending, and finally, a lot of hand welding.

It's different now. Trailmobile avoids hand work on main frame members by welding J-rails of high-strength steel on automatics. It makes two varieties of J-rails: One with web and flanges of heat-treated constructional alloy steel (90,000 psi minimum yield strength). The other J-rail is a hybrid. Its flanges are of heat-treated steel, its web of low-alloy high-tensile steel (50,000 psi minimum yield). Which one Trailmobile uses depends on the customer. The all-heat-treaded steel rail will take about 20 percent more load than the hybrid rail.

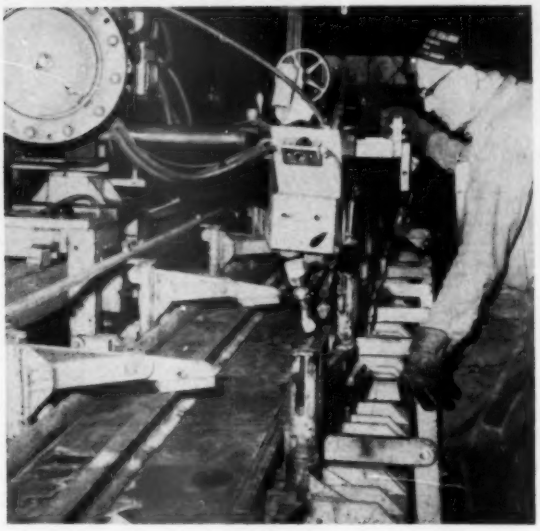
To weld J-rails, Trailmobile built welding fixtures having hydraulic clamps. The operator fillet welds the wide flange to the web first (see inset). The 3/16-inch fillet on a hybrid rail penetrates the joint 80 percent as the welder rushes along at 51 ipm. Welding current is 700 amps, voltage 29.

The toe of the J is a bar. The submerged arc weld joining it to the web penetrates full depth. The machine welds 56 ipm; amperage is 525, voltage, 29.

J-rails are longer than mill-length plates. To get the needed length, the company butt welds mill lengths.

SECRET OF TRAILER STRENGTH and lightness is high-strength steel. The principal applications are the main-frame member J-rail (inset, left) and upper fifth wheel (inset, right).

OLD J-RAIL (left): Heavy, carbon steel beam took hand flame cutting, bending, and welding to shape it for the trailer.
NEW (below): High-strength web and flanges assemble and weld quickly and accurately into automatic submerged arc fixture.



trailer payloads

It flame cuts the webs to width and butts them with automatic submerged arc. Flanges are butt welded by hand. Trailmobile uses low-hydrogen E11018 electrodes to join the heat treated alloy steel to itself. These electrodes make welds as strong as the plate. The company joins the dissimilar high-strength steels by automatic welding with a low carbon wire containing 0.5 percent moly, and with the same kind of granulated flux used for welding regular steel. When the company welds all-heat-treated alloys, automatically, it uses alloy wire (8620 or equal) and a mixed flux. This flux is partly the standard flux, partly one that limits silicon and manganese in the weld.

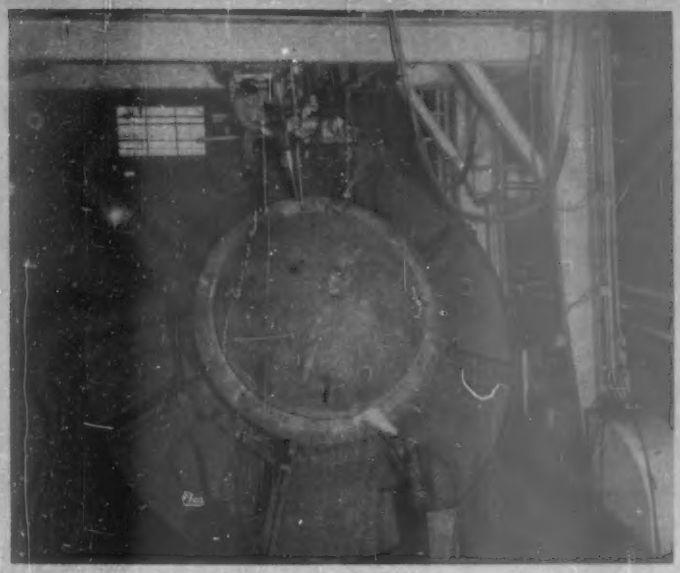
TRAILER ASSEMBLY ROLLS OVER

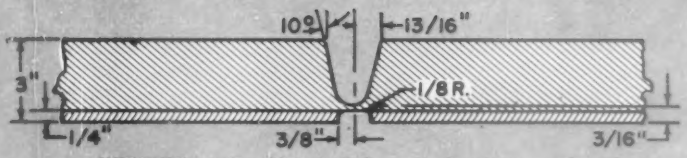
The trailer-building line consists of five stations. The rollover station is the largest. Workers assemble right and left J-rails, side rails, and cross bolsters in it, then operators join them. The jig, at working height, straddles a pit with trunnions at both ends so that men can roll the job over when one side is done. The bolsters, cross members that strengthen the flatbed frame, are I-beams. They go through slots in J-rail webs, flame cut before the rail is made. Bolster spacing varies with the trailer length.

A heavily loaded part of the trailer is the upper fifth wheel (see inset). The upper fifth wheel, you know, is the trailer half of the coupling that connects the trailer to the tractor. Trailmobile gets strength with lightness here with a grid-like structure made of 3/16-inch-thick high-strength steel. Sheets are sheared, then flanged one edge on a press brake. In-between pieces are notched to fit mating flanges. The company welds flanges solid, joins grid parts to each other with intermittent fillets. Diagonal plates welded the center grid, hold the fifth-wheel pin rigidly.

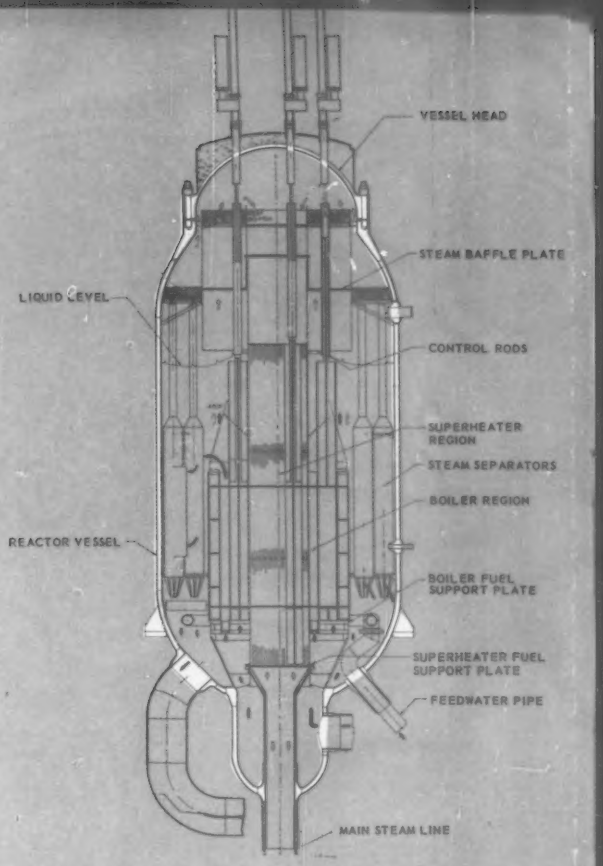
Never one to stand still, Trailmobile seeks ways to weld better and faster. For example, there's the welding school. Before the company turns operators loose on production welding, they are thoroughly trained—especially in the peculiarities of welding the high-strength steels. They are taught manual, semiautomatic, or automatic welding, depending on what their assignment is to be when they are graduated.

Trailmobile is using more and more semiautomatic welding. The advantages of semiautomatic welding are many: Besides greater speed, welds can be better. There are fewer stops and starts. There's less danger of moisture pickup and hydrogen release to crack welds. The company has found that even a half of one percent of moisture in stick electrode coatings can get them in trouble with the high-strength steels—particularly the heat treated constructional alloys. They avoid this problem now by heating low-hydrogen electrodes before use. • •





WELDING: A-C welds principal seams of reactor vessels with automatic submerged arc. One of the keys to joint quality is an accurately machined welding groove in the clad metal. Operators welding reactor's overlayed top-hot forging, heat it to 300 F for welding the steel side.



How we fabricate stainless clad

IN BRIEF: When you build nuclear reactor vessels you must know metals, welding, inspection, cleaning, and heat treating.

IT TAKES SKILL, care, and husky-but-accurate equipment to build pressure vessels for nuclear reactors. If your process control is loose, if you lack skill, or if your equipment is puny, everything about the job suffers: Metal, properties, performance, delivery, costs. It takes stout equipment, plenty of know-how, and more-than-usual care to do reactor work.

Codes help too. They give the minimum requirements for building pressure vessels. These are the ones we use in building nuclear components:

- ASME Boiler and Pressure Vessel Code
- Nuclear Code Rulings
- ASTM Material Specifications
- Our Own Specifications

A RECORD ON EVERY VESSEL

We keep records on materials and the finished product. These records include: Part name, physical and chemical test results, heat numbers, dimensions, X-ray films, ultrasonic reports, welding procedure and qualification records, hydrostatic test results, and nondestructive test reports. These reports become part of the permanent record of the product.

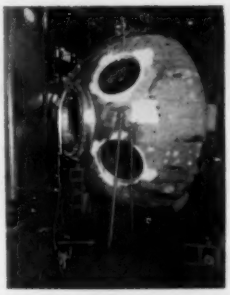
WHO DECIDES ON THE METAL?

Our design group has the last word. They don't say it, however, until they meet with our material and fabrication groups. Out of this meeting comes simplified design and practical fabrications. Economy and fabricating peculiarities of the metals are not forgotten.

For the Pathfinder reactor vessel, the designers chose clad steel. The 3-inch wall has ¼-inch of Type 304L (low carbon) stainless steel cladding, and 2¾ inches of A-212 Grade B carbon steel backing. We use low-carbon cladding to limit carbide precipitation during welding and stress relieving. The stainless steel resists corrosion, the carbon steel provides strength. The designers take the same care in choosing material for other reactor parts: covers, pumps, piping, and nozzles.

X-RAY: Welds on the inlet section of the reactor are radiographed with an A-C betatron. The company X-rays every weld to verify its conformance to the requirements of the Unfired Pressure Vessel Code. X-ray is but one of a number of quality tests performed on the reactor.

MACHINING A REACTOR VESSEL



When you machine reactor vessels, your equipment better be able to handle big loads and do accurate work. This machine is cutting the all-important welding grooves for inlet nozzles in a vessel head that isn't exactly light. Allis-Chalmers machines the steel side of the clad pressure vessels at the same speeds and feeds it uses for mild steel. It machines the stainless side slower, but with firm feeds. It doesn't drag cutting tools on stainless; this can harden and gall the metal. It machines bearings and sealing surfaces to 63-microinch (r.m.s). It machines the flange, grid plate support, and bores to 125 microinches. It machines nozzle and pipe openings for a good fit.

A-C doesn't refinish the cladding. This as-rolled metal already has a 250-microinch finish. This is good enough for the job and smooth enough for dye penetrant inspection.

reactor vessels

by **JOSEPH POTOCHNIK**, *Allis-Chalmers Manufacturing Co.*

FORMING: COLD AND HOT

We form pressure-vessel cylinders cold on heavy plate-bending rolls. We avoid cracks by bending the metal *across* the direction of rolling. Before rolling, we machine J-grooves on the plate edges (see sketch). After rolling the clad side in, we weld the seam automatically. Then we normalize the shell at 1,650 F. Heating also stress relieves the cold-worked stainless cladding.

Another precaution before machining or rolling: Remove chips and loose scale from plates and machines. If we imbed this matter in the stainless, we give corrosion a toehold.

We hot form heads, head segments, nozzles, and small parts on a 4-post hydraulic press. We align a flat blank between dies and four hydraulic cylinders squeeze the blank. Before forming, we heat blanks between 1,700 and 1,900 F. We heat treat them after forming to obtain good mechanical properties.

WELDING DETAILS

Clad metal likes welding, but it insists on an accurately machined groove. We weld in the U-groove on the steel side first. Welding operators use E7016 or E7018 electrodes or the equivalent in submerged arc wire and flux for automatic welding. The operators carefully fuse the root pass into the carbon steel but avoid penetrating into the stainless.

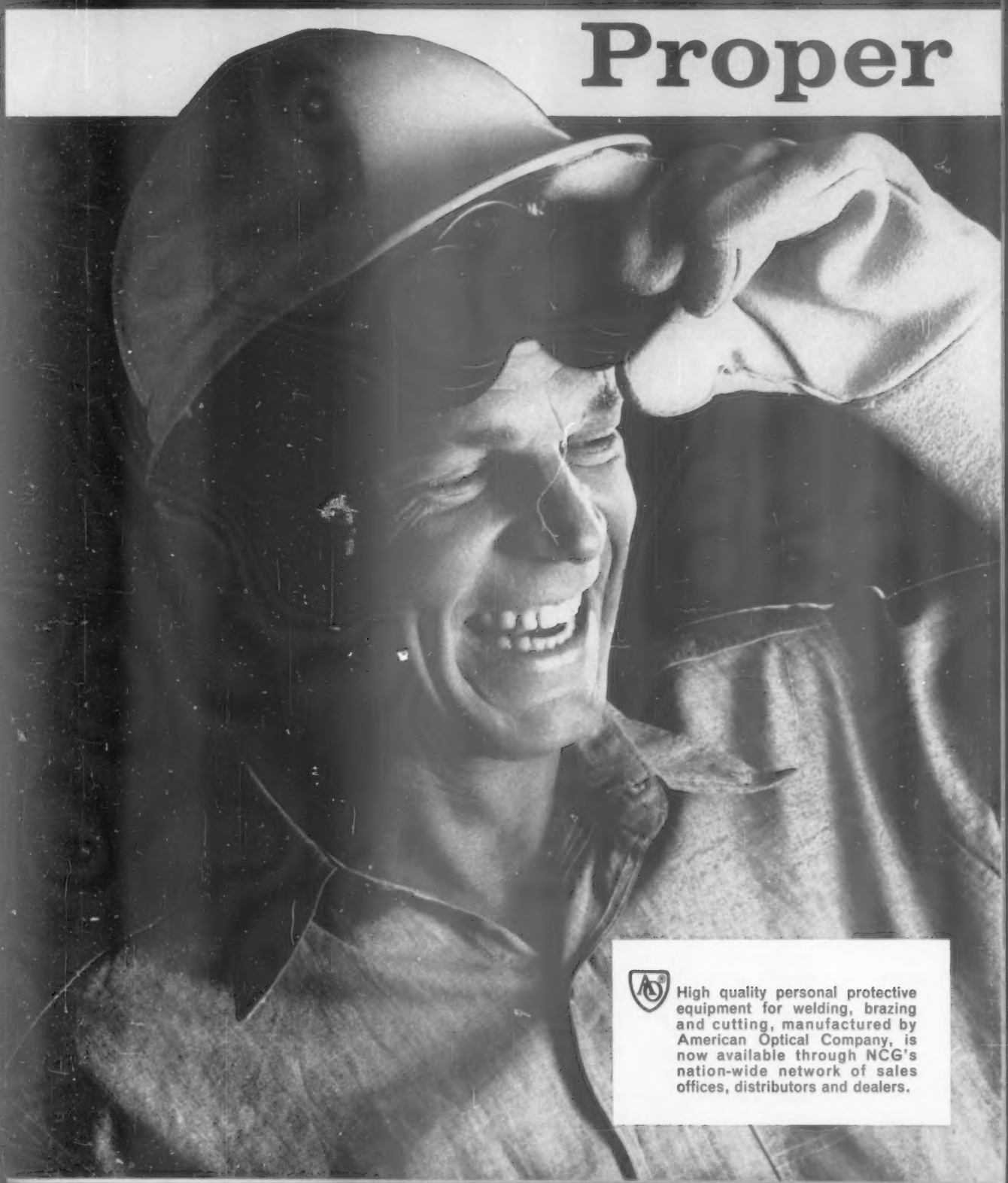
Next step, workers chip or grind the clad side of the joint until they come to clean, sound metal. Unfused notches could concentrate stresses; trapped slag could make stainless welds porous. Then welding operators deposit carbon steel welds in the clad-side groove to bring it up to the stainless steel level. Then, they make one pass with Type E309 Cb electrodes or equivalent automatic materials. This weld acts as a seal between the carbon steel and the cladding. The operator finishes the clad side with E308L electrodes, or submerged arc. These full-depth welds conform to the pressure vessel code.

HEAT TREATMENT

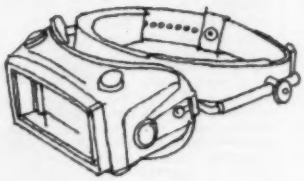
We heat treat pressure vessels to get good fabricating and working properties. We stress relieve the ves-

continued on page 52

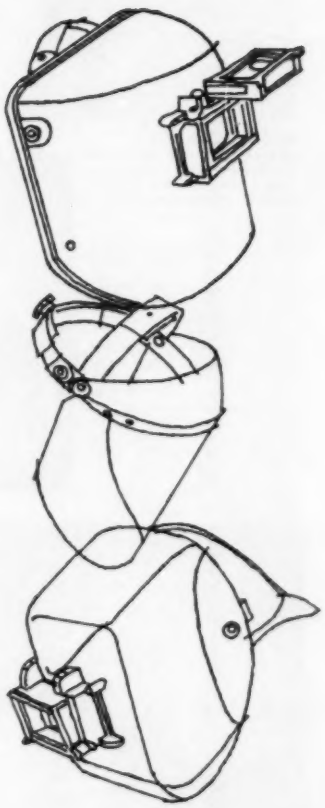
Proper



High quality personal protective equipment for welding, brazing and cutting, manufactured by American Optical Company, is now available through NCG's nation-wide network of sales offices, distributors and dealers.



protection keeps me happy



No one wants an accident—but just in case—*proper* protection, can prevent painful, costly injuries that often cause serious disabilities. Insurance does help, but no matter how much money is received as compensation, it is small return for the permanent damage that could have been avoided.

Your working skills and general well-being must be carefully protected. *Just any old* kind of protection won't do. Different jobs require different kinds of protection. The proper kind of protection for your welding, brazing and cutting jobs is available from your nearby NCG distributor or dealer. Send today for NCG Catalog N-177-E-3N.

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NCG®

NATIONAL CYLINDER GAS

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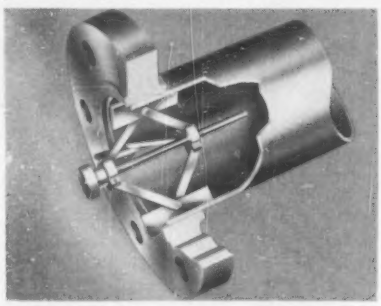
For More Information Circle No. 57 on Reader Service Card.

CURV-O-MARK
A CONTOUR MARKER PRODUCT

CENTERING HEADS
Actually it's five tools in one—replaces protractor, centering head, center punch, level and scale. Y-Type head is accurately machined with tangents and tips to serve in centering and aligning. Dial set level is marked in 2½ and 10 degree graduations for easy reading. Punch is of drill rod, with special point for long service.



FLANGE ALIGNING TOOL
This self-centering tool makes pipe line construction faster and more accurate. It is quickly adjustable for all type of flanges or pipe sizes ranging from 3 to 12 inch diameters.
After easy insertion in pipe, Flange aligning tool centers itself snugly against the inside pipe diameter and automatically aligns with pipe axis.

RADIUS MARKER
The Standard Radius Marker folds to pocket size. This sturdy, folding Radius Marker has a span of 24" and easily swings a 48" circle or arc.
The Jumbo Radius Marker is also the folding type, has a span of 48" and easily swings a 96" circle. These tools are precision made of rust proof aluminum dural.
The Standard Radius Marker folded, measures only 9¼" in length, weighing only 8 oz. The Jumbo model, of course, is larger. Both are equipped with special spring washers to maintain accuracy and rigidity for years of service. Pencil holder is made to hold round or flat pencils, soapstone, or steel point.

PROTRACTOR
The Ang-Lo-Cator Protractor is the only measuring device that quickly and accurately determines correct degree of angle on any pipe or structural material, regardless of size. A valuable aid to weldors, structural workers and pipe fitters. Size 4" x 8".

CONTOUR SALES CORP.
1843 East Compton Boulevard, Compton 2, California
See Your Welding Supply Dealer For All Curv-O-Mark Products

For More Information Circle No. 25 on Reader Service Card.

BIG FORGINGS, like this reactor closure flange, are overlayed with stainless steel weld. The overlay is the same composition as the plate cladding in the cylinder.

sel twice; once when it is partially welded, again after rough machining. This keeps the vessel from warping. We eliminate most of the welding stresses with an hour-per-inch-of-thickness stress relief followed by a slow cool. We also heat the vessel six hours at 1,100 F and furnace cool it to take stresses out of the stainless and to make it ductile.

INSPECTION IS CRITICAL

We inspect the welded vessel with destructive and nondestructive tests. In destructive testing, we use the same metals we use in the vessel and reactor components. Metallographic and physical tests disclose the soundness and properties of the base metal, weld, and heated metal.

Before we fabricate clad plates we inspect the cladding bond ultrasonically. We reject plates with unbonded spots.

We radiograph all welds. They must pass Paragraph UW-51 of Section VIII of the Unfired Pressure Vessel Code. We inspect the first two passes and the last pass on the carbon steel side with magnetic particles. We inspect the root-chipped stainless-side weld-groove with dye penetrants. We never peen first or last passes; peening could crack them. We remove defective welds mechanically, never with arc or flame.

Finally, we inspect the whole stainless interior with dye penetrants. If there were cracks, they would foster corrosion of the steel and concentrate stresses.

We use hydrostatic testing as a design test and to locate leaks. We test at 1,050 psig with the metal between 40 and 60 F. If we tested the carbon steel any colder it would be too brittle and too dangerous to test. If we find leakers, we cut them out and repair weld.

CLEANING IS IMPORTANT TOO

Since any kind of dirt encourages corrosion, we clean the inside of the vessel thoroughly. We do it with acid which we rinse off with warm water. Then we neutralize the remaining acid with a 2 percent ammonia solution. Finally, we rinse with water.

We degrease any surface that the primary fluid will contact. We get rid of dirt, grease, slag, metal chips, and weld spatter. Any dirt we miss will come off in the final cleaning at the installation. We sandblast the outside of the vessel, then paint it to resist corrosion during shipment. • •

Facts At Your Fingertips

If you want details about products described or advertised in this issue, circle the number on the card that corresponds with the number under each advertisement or product description.

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6	18	30	42	54	66	78	90	102	114	126	138	150	162
7	19	31	43	55	67	79	91	103	115	127	139	151	163
8	20	32	44	56	68	80	92	104	116	128	140	152	164
9	21	33	45	57	69	81	93	105	117	129	141	153	165
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5	17	29	41	53	65	77	89	101	113	125	137	149	161
6	18	30	42	54	66	78	90	102	114	126	138	150	162
7	19	31	43	55	67	79	91	103	115	127	139	151	163
8	20	32	44	56	68	80	92	104	116	128	140	152	164
9	21	33	45	57	69	81	93	105	117	129	141	153	165
10	22	34	46	58	70	82	94	106	118	130	142	154	166
11	23	35	47	59	71	83	95	107	119	131	143	155	167
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ADVERTISEMENTS—a showcase o the latest in components, equipmen and techniques.

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8 Tips on grinding wheel safety

THERE IS LITTLE DANGER of injury during grinding and finishing operations if proper mechanical guards and personal protective equipment are used. There is always the possibility of faulty equipment or personal carelessness, but proper precautions can cut danger.

VISUAL INSPECTION

Upon reaching the user, grinding wheels should be unpacked and given a thorough visual inspection. Despite the unusual strength and durability of the wheels used in weld grinding and finishing, they are not indestructible. Careful visual inspection is the first step in grinding wheel safety.

OPERATING SPEEDS

A grinding wheel's maximum safe operating speed is marked either on the wheel itself or on the blotter. Operators should be cautioned to never use a wheel with a safe speed maximum below that of the grinder. The speed governor on air-driven portable grinders should be checked for proper adjustment.

PROPER MOUNTING

Flanges should be of proper size and shape, of equal diameter, and relieved so the bearing surface is well removed from the area around the wheel hole. The wheel should slip onto the spindle with an easy, sliding fit. Forcing a tight fit between wheel and spindle is an invitation to breakage. Only approved-type adaptor flanges should be used if the grinder has a spindle smaller than the wheel hole size. In tightening, the spindle nut should be drawn up securely, but *not* with excessive pressure which could cause stressing of the wheel and possible breakage.

Information on proper mounting is supplied with the portable grinder when it is purchased, or can be obtained from the machine or wheel manufacturer.

After mounting, the wheel should be given a one-minute "run-in" test, holding the grinder under a bench as a precaution against possible breakage.

WHEEL GUARDS

There's risk in using any machine, but it's negligible if normal care is taken. When guards are removed, however, the risk becomes many times greater. New portable grinders have proper guards, but all too often operators remove them in the mistaken belief that guards are in the way. Safety standards for portable grinders allow for adequate wheel exposure.

Guards are particularly important on portable grinders. If one that's unguarded is dropped, for example, wheel breakage occurring the next time the machine is started could be serious.

ABUSIVE OPERATION

Despite obvious hazards, many workers persist in using excessive wheel speed or pressure and hitting or bumping the wheel against the work. They think they can remove more stock this way. Experience shows that no real efficiency can be gained by boosting wheel speeds beyond maximum ratings, that the weight of the grinder is just about right for the best grinding, and that hitting or bumping the work with the wheel leads to breakage, and injury.

OPERATOR PROTECTION

Worker attitude is the safety engineer's last big frontier. First, the need for safety must be made convincing. Instruction in safe job performance comes next. Then pin-point responsibility for continuing safety supervision. When violations occur, the worker should be told what he did wrong, why, and how to do it right.

SUPERVISED STORAGE

Abrasive wheels should be kept in a supervised central storage room which is free from extremes of temperature and humidity. Racks should be set back from plant traffic lanes and protected from vibration and inadvertent bumps. Thin resinoid wheels and discs should be stored flat to prevent warping. Flaring cup wheels should be placed base-to-base and rim-to-rim. Straight cups, small straight wheels, and cylinder, need an elevated front-edge or cradle supports.

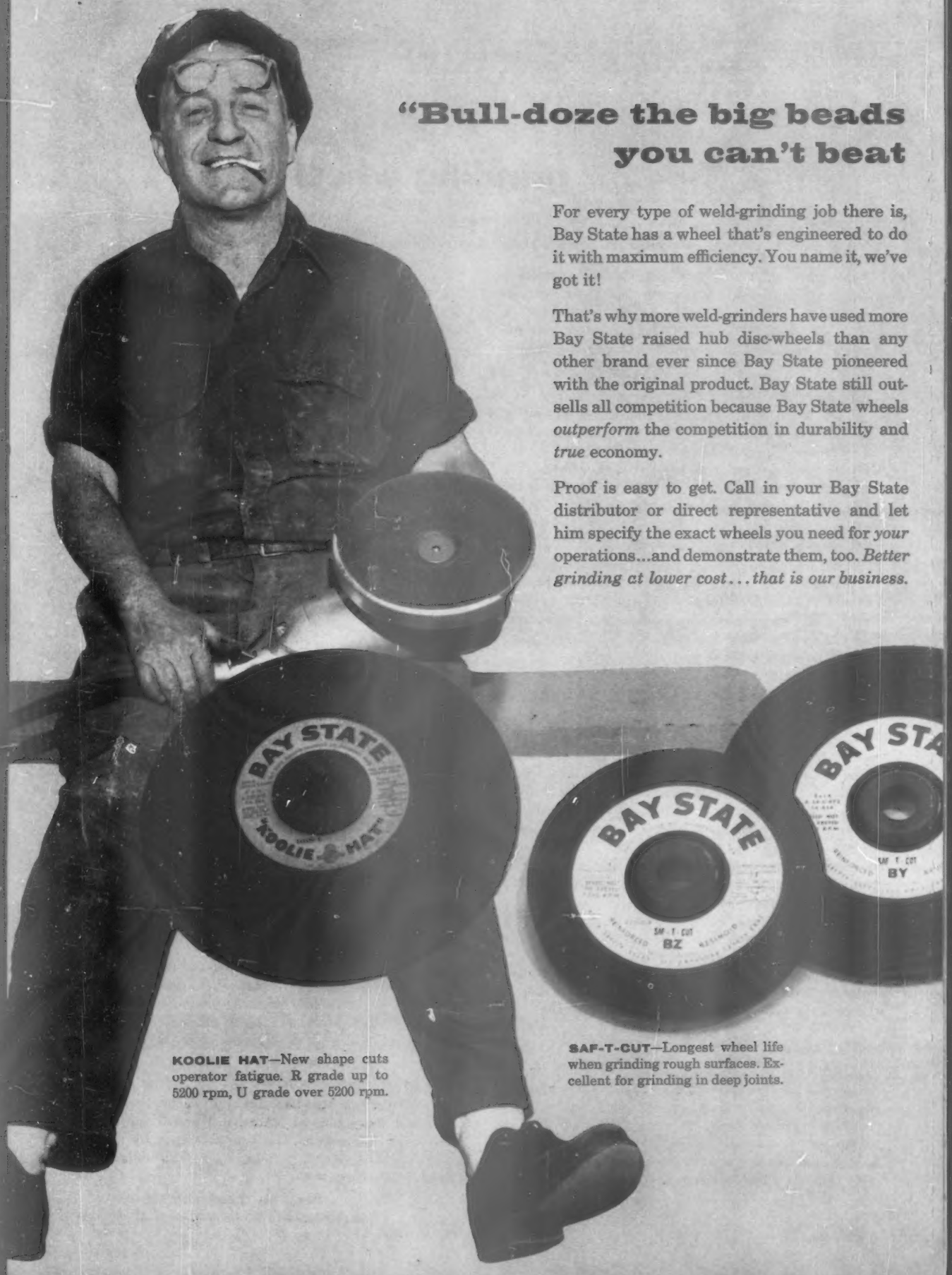
CAREFUL HANDLING

Provide a protected set-aside spot for the portable grinder. Use a V-shaped trough under the bench, a hook, or some other suspension device out of the way overhead. If the grinder is laid on the bench momentarily, it should be placed well in from the edge.

MORE SAFETY INFORMATION

"The American Standard Safety Code for the Use, Care, and Protection of Abrasive Wheels" contains more safety information. Get your free copy by writing the Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio. • •

Circle No. 75 on Reader Service Card. ⟶



"Bull-doze the big beads you can't beat

For every type of weld-grinding job there is, Bay State has a wheel that's engineered to do it with maximum efficiency. You name it, we've got it!

That's why more weld-grinders have used more Bay State raised hub disc-wheels than any other brand ever since Bay State pioneered with the original product. Bay State still outsells all competition because Bay State wheels *outperform* the competition in durability and *true* economy.

Proof is easy to get. Call in your Bay State distributor or direct representative and let him specify the exact wheels you need for *your* operations...and demonstrate them, too. *Better grinding at lower cost... that is our business.*

KOOLIE HAT—New shape cuts operator fatigue. R grade up to 5200 rpm, U grade over 5200 rpm.

SAF-T-CUT—Longest wheel life when grinding rough surfaces. Excellent for grinding in deep joints.

or blend with a feather-cut . . . these wheels for <u>any</u> job!"

NEW READYMOUNT—Integral with wheel so wheel screws directly onto grinder shaft. Wheel changes are made in seconds. Discard mount with used wheel. Available on Blue Flash and Koolie Hat lines in 7 x ¼ and 9 x ¼ sizes.

DURACUT—Smoothest cutting action for blending and surfacing.

BAYFLEX—Smooth, controlled cutting action for work where smooth finish is important.

BLUE FLASH—Fastest grinding action, ideal for grinding corner welds. Open face for free cutting.

BAY STATE ABRASIVES

BAY STATE
WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
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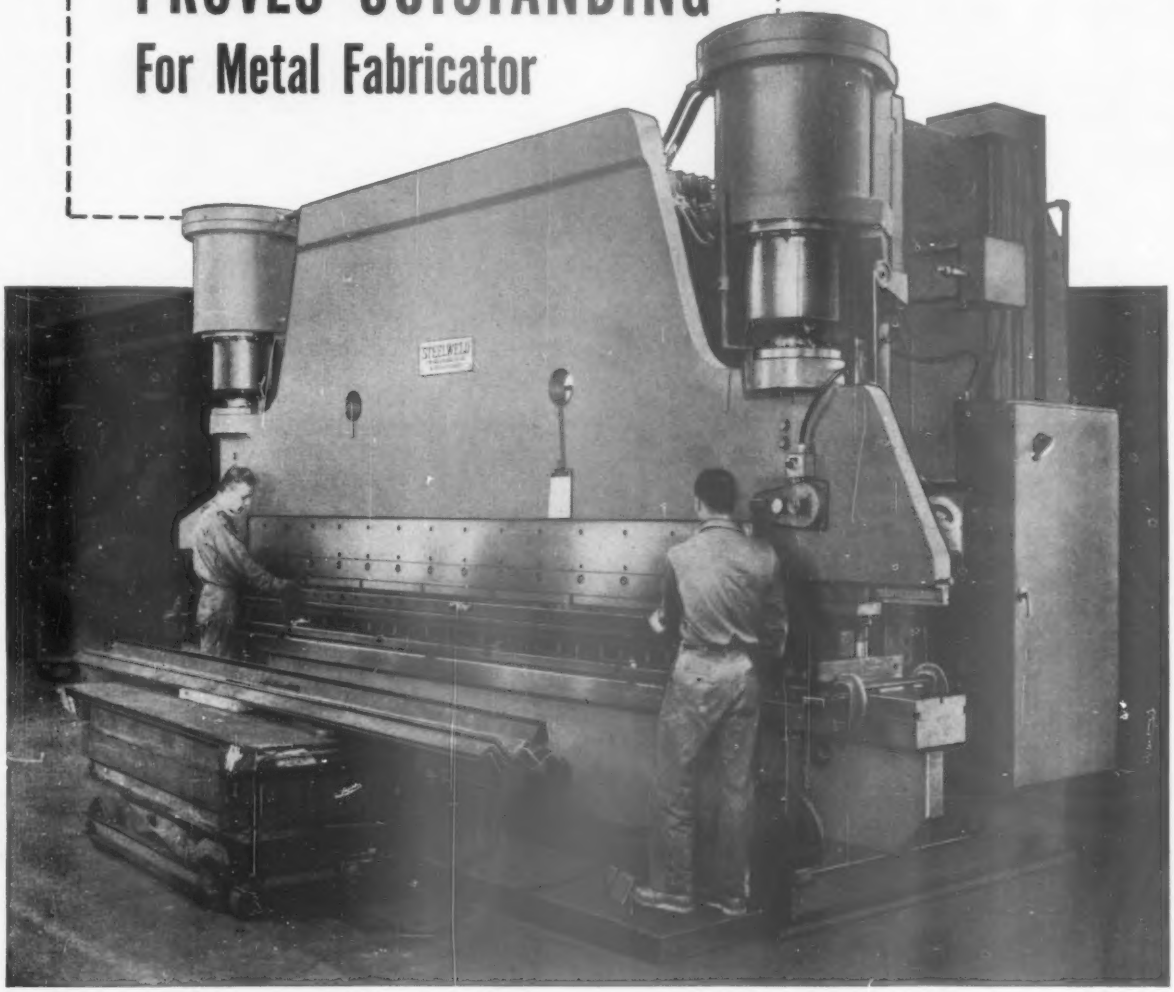
Hydraulic Press Brake PROVES OUTSTANDING For Metal Fabricator

Model MH16-14 Steelweld Hydraulic Press Brake. Overall bed and ram length 20'-0". Capacity 650 tons.



A 650 ton Steelweld Hydraulic Press Brake is a mighty important tool at The Bargar Metal Fabricating Co., Cleveland. It performs a wide range of operations such as bending, forming, stamping, punching, drawing.

The brake is especially good for bending large plates, because the ram can be traveled at exactly the right speed to prevent whipping of the plate. Sometimes plates as large as 10' x 20' x ¼" are bent.

The machine is very useful for drawing operations, excelling mechanical press brakes for this work, because it can be operated at the speed that is most suitable for the metal. Also, the ram can be traveled through a greater distance because of the unusually long 16-inch stroke. The power is constant for the entire stroke.

Much punching is done with the Steelweld, and this work is speeded by adjusting the ram stroke to travel only slightly more than the thickness of the plate. The fact that the ram can be inched to the work and backed away whenever desired is another time-saving feature especially helpful when setting up dies.

The Bargar Company has one of the finest and most completely equipped sheet metal fabricating plants in Cleveland. The Steelweld Brake is a good example of their modern production facilities.

Write for free booklet No. 2024

STEELWELD
MECHANICAL and HYDRAULIC
PRESS BRAKES

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

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For More Information Circle No. 24 on Reader Service Card.

Welded surface plates stay flat

says **ADOLPH H. KLEINSORGE,** *chief engineer, W. B. Knight Co., St. Louis*

IN BRIEF: How do you check the flatness of machine surfaces when your surface plate is neither flat nor portable? The W. B. Knight Company did it this way.

SURFACE PLATES are commonly used to measure flatness—of tools, fixtures, machine bases, frames, and other things. Until now, surface plates have been cast iron, semisteel, or stone. Now we've made one of welded steel, and it's better in many ways.

You measure flatness of small parts by rubbing them on a blued surface plate. The high spots pick up the blueing, showing machinists where to scrape to level the surface. The machinists scrape and rub until the part is as flat as it need be.

But you can't rub a large machine base on a surface plate. You have to rub the plate against the work, and the work may be in almost any position. You need a plate that's portable. A stone plate stays accurate but won't do because it isn't portable.

WHY NOT CASTINGS?

What you end up with—in work and in flatness—depends a lot on how accurate the surface plate is when you use it. You know that cast plates change with the weather or with the heat of the part you're measuring. Cast surface plates usually have ribs meant to keep them from deflecting. The ribs taper so the casting can be pulled out of the mold. But because the ribs taper, they don't expand uniformly. Thin sections heat faster than thick ones; and there goes the accuracy of your plate.

WHAT MAKES SURFACE PLATES DEFLECT?

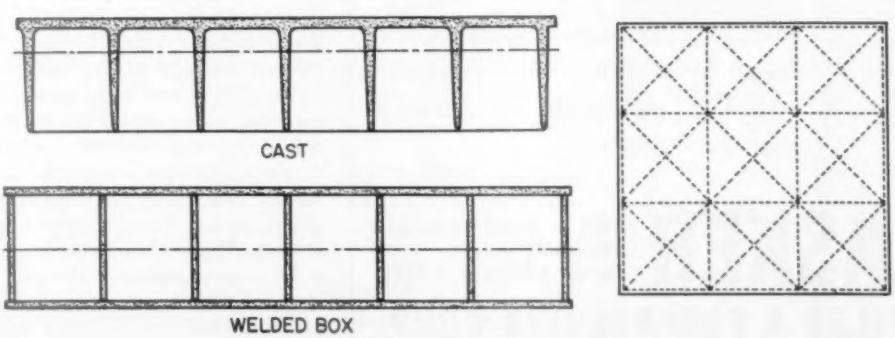
A surface plate that deflects the least is the best. And there are a lot of things that can throw a deflectable plate off. The surface you check is one. It may be concave, convex, or a combination of irregularities. A cast iron plate curver is the iron itself; it has different properties in different places. During casting, the ribs cool fast, become hard and dense. The slower-cooling, thick sections are softer and weaker.

We decided that the way to beat deflection in a surface plate was to build a box-shaped one of welded steel. In steel, the plate would be stronger, lighter, and more uniform. We chose Firebox Quality constructional alloy steel. This heat treated, 100,000-psi-yield-strength steel has uniform properties. It doesn't soften in stress relieving. It has good wear resistance. It's tough.

We needed a 4-foot-square surface plate to true the ways of a jig borer base. We designed a welded steel box with a webbing of ribs (see sketch). We figured the deflection would be 0.000056 inch. Then we com-

continued on page 58

A SURFACE PLATE that changes with the weather and the heat of the parts it's used to measure isn't much help in making machine surfaces flat and true. A cast plate has different properties and thicknesses in different parts; it can't stay true. A welded plate, being uniform in properties, thicknesses, and shape, changes very little. The ribs (right) strengthen the welded plate.



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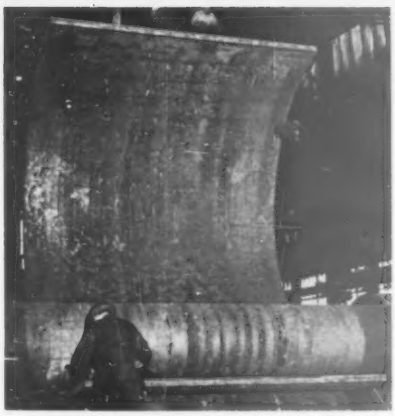

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WELDED SURFACE PLATES

continued from page 57

pared the deflection of a hypothetical cast iron plate of the same weight. It was 0.00020 inch, 358 percent more than the steel plate. And we found other advantages to the welded box:

- It is symmetrical
- Its uniformly-thick parts expand alike
- It has no exposed ribs to pick up heat
- It has the same properties throughout
- It has two usable surfaces—one for rough scraping; the other for final scraping and measuring
- It eliminates the making, maintenance, and storage of patterns

Another advantage to welded plates: They require fewer scrapings to keep them flat. They only ask to be scraped every two or three months. And scraping is a big job; each side takes 12 hours. To keep cast iron plates flat, you scrape them several times a week.

CONSTRUCTION DETAILS

We made ribs and end plates the same height. We assembled and welded center ribs first so that the operator could reach in to weld them to cover plates. He did it with fillets on either side of the ribs, preheating the metal first to 400 F. Then we fitted successive ribs around the center. This meant welding a good many ribs from one side. On 1-side welds, we duplicated the volume of 2-fillet welds by beveling the ribs. Then we plug-welded end plates to the ribs. This welding procedure gave maximum support to top and bottom plates and kept the rib-pattern regular. We used E12015 low-hydrogen electrodes to develop the full strength of the plate and to prevent underbead cracking.

We vented compartments with ¼-inch holes in ribs and sides to prevent air pressure from building up. We stress relieved the surface plate at 1,000 F and air cooled it from 800 F. In the furnace, we bedded the surface plate in sand to prevent warpage. Then, after machining, we scraped the plate to within 0.000050 inch of flatness.

THE CRUCIAL TEST

We compared the deflection of welded and cast iron surface plates. First, we supported the welded plate on 3-point supports on a master stone plate. A dial indicator told the story: Deflection was only 0.0001 inch. Four hours later and 10 more heat degrees, the deflection was still 0.0001 inch.

We didn't have a 4-foot-square cast iron plate to compare, so we used a 16- by 18-inch one we had. It was also scraped to within 0.00005 inch of flatness and supported on three points. The cast iron plate deflected 0.0003 inch along one edge and 0.0007 inch on the other. An hour later, the deflection grew to 0.0005 inch and 0.0008 inch. Three hours later and 8 degrees more room heat straightened the cast iron plate to 0.0001 inch and 0.0004 inch. This was all the proof we needed of the welded surface plate's superiority. • •

New, Lightweight Face Shield Offers Full Protection

Where full facial protection is required, you'll find the new AO H9 Face Shield is a cool, comfortable answer. Its lightweight plastic headgear weighs only 3¾ oz., can be preset in ⅛ increments from size 6 to 8¼. When set, entire face shield lifts easily on and off.

A deep spark deflector of lacquer-coated, vulcanized fiber keeps particles from entering top of shield, protects forehead. Automatic friction joints require no turning or adjustment. Vinyl foam sweatband provides a cool, comfortable bearing surface resting on the forehead. It absorbs perspiration, preventing it from carrying particles into eyes. Adhesive-backed, it is easy and economical to replace.

This new H9 Headgear accommodates all AO 'H' Series windows—clear or green acetate, a.uminized acetate, 24 mesh steel screen, and 283-1 Kool-Vent window. Patented slots permit expansion and contraction, reduce possibility of warping and distortion. For details and prices, call your AO Safety Products Representative or write for folder.

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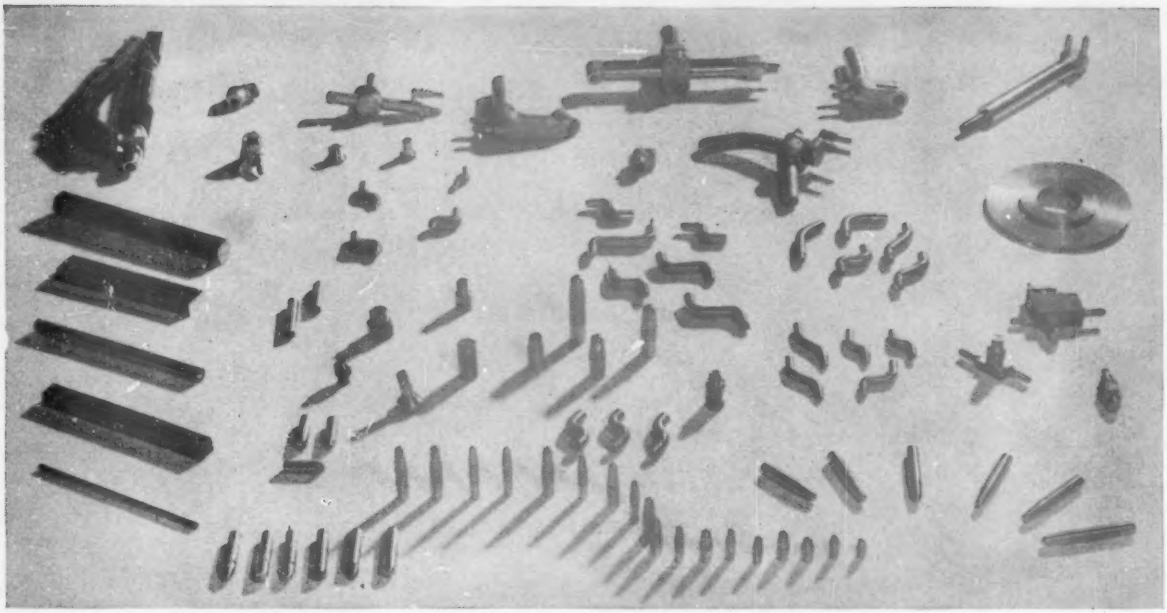

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Over 200 Standard Mallory Electrodes: single bend, double bend, straight, swivel and offset types; round, dome, flat and conical tips. "Special" designs, too—all *standard* with us . . . in price and in availability. In Mallory-developed alloys for every combination of metals and welding pressures. Many with such Mallory extras as fluted cooling holes, bent-in-place cooling tubes* for added efficiency and life.

Mallory Holders: a dozen interchangeable parts to make over 1000 setups; plus a variety of standard holders.

Mallory Seam-Welding Wheels: cold-forged of special Mallory alloys for longest service in heavy duty. Also economy-priced wheels for medium duty.

*U. S. Patent 2,489,993

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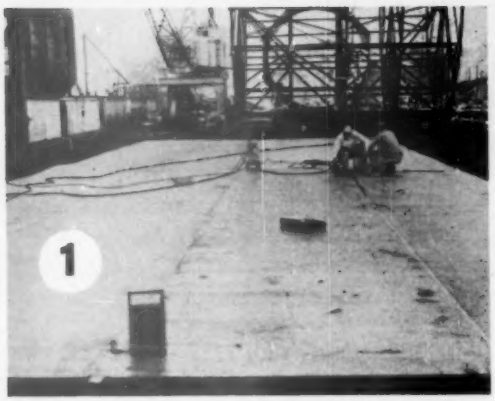
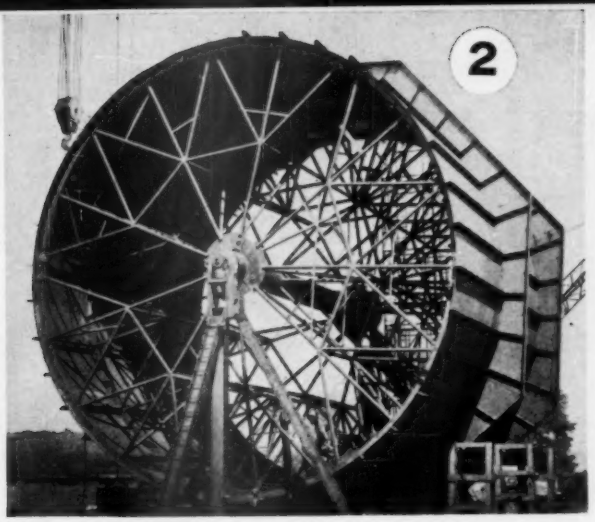
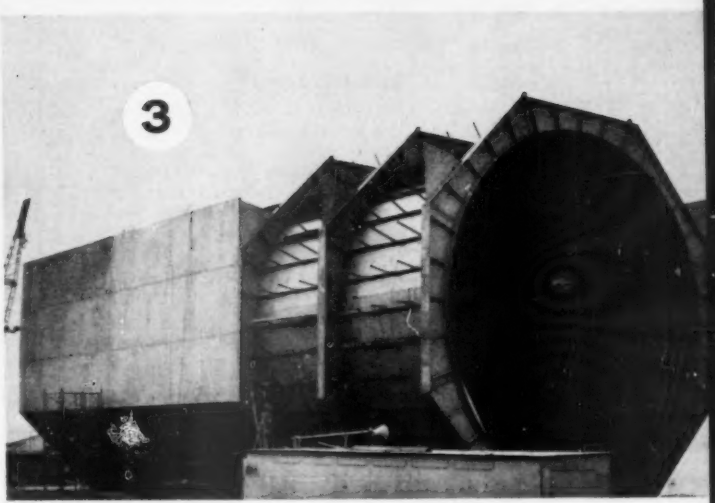






BUILT LIKE A SHIP, but with production-line differences, tunnel sections go together in three stages: **1**—Operators butt-weld eight, $\frac{5}{16}$-inch plates with mechanized submerged arc on huge yard tables; **2**—Workers wrap the 30- by 102-foot plates around a Ferris-wheel jig to make cylinders, and weld on stiffeners and octagonal diaphragms; **3**—They join subsections on ways and weld cover plates on. This section is about a third the length it will be when it is launched.

600-ton tunnel weldments float to the job

IN BRIEF: Welded fabrications can be huge—and still deliverable. This fabricator built 300-foot, 600-ton weldments of steel, then floated them to the tunnel site.

IF YOU WANTED TO TUNNEL under a river in the old days, you did it by drilling and digging. Today, you build a tunnel in steel sections—hundreds of miles from the site, if need be, and float it there and sink it. This is how the 3,642-foot tunnel was built that will connect Norfolk and Portsmouth, Virginia. It will carry two lanes of traffic under the Elizabeth River.

Wiley Manufacturing Company built the 300-foot-long, 33-foot-wide steel sections in their yards at Port Deposit, Maryland, on the Susquehanna River. The company coordinated the work so well, it was able to launch a section every three weeks.

The first fabricating step was to splice eight, 5/16-inch-thick mill-size plates to make a 30- by 102-foot one. The big one becomes one of the shell cylinders of a floating section. The steel is ASTM A-373 and A-36 hot-rolled plate. To splice, Wiley tacked square-sheared plates together on its big, angle-and-beam yard tables with stick electrodes. The company uses Lincoln ML-2 Squirt welding guns mounted on travel buggies to make shell plate welds. Weld speed is 24 ipm.

LOTS OF SPEED, LITTLE WARPAGE

When operators finish welding one side of the big plate, riggers turn it over with a gantry crane for back-side welding. These welds penetrate the first welds at speeds that preclude much warping. The welds are at least as strong as the plate.

While the spliced plate is still on the table, operators weld longitudinal stiffeners to it. They make in-

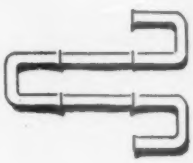
continued on next page

GOT A JOINING PROBLEM?

Having trouble with corrosion? Dissimilar or unusual metals? Successive joints on the same work? We'll tackle it . . . at no cost to you.

Tough joining problems gave this company its start. Every time we solved a problem we had a new customer . . . and often a new product to sell! That's how we got into the special alloys business in 1946. That's how we grew.

FOR EXAMPLE



Automobile air conditioning units called for a low-cost but highly corrosion resistant heat exchanger with freon-tight seals in aluminum tubing. ALL-STATE developed a cadmium-zinc alloy that was low in cost, resistant to all atmospheric conditions, and leak-proof. Same alloy now used for repair of automobile radiators.

Our 430° non-acid flux was developed for joining stainless with minimum hazard to users. A subsequently discovered application was joining Hydro T-metal without discoloration.

It took months to figure out how to braze the cathode wire to the terminal inside radio vacuum tubes without blackening the inside of the tube. Our silver-copper-indium alloy lowered brazing temperature without increasing vaporization rate, solved the problem.

Stainless steel kitchen sinks became economically feasible only after we helped a manufacturer solve the problem of a perfect color match with a monel gas welding rod.

We still like tough joining problems. That's why we invite you to put your joining problem up to us. We may fail or succeed, but we'll work on it with the best research brains and equipment, and it won't cost you a penny.

Write and tell us what your joining problem is, with the essential details.

Send for a free copy of our 56-page Manual and Catalog.

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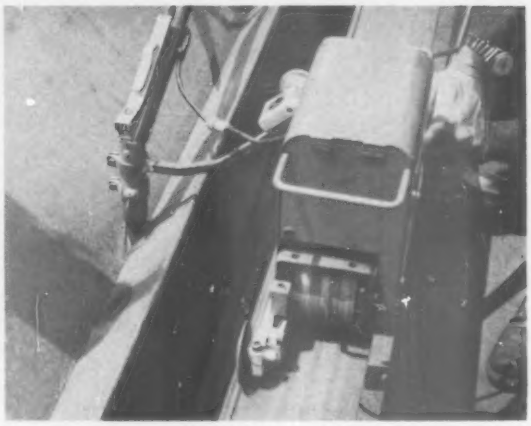
WELDED TUNNELS *continued from page 61*



WHEN YOU WELD by the mile, as you do when you build a tunnel, you better do it mechanically. Diaphragm flanges are welded here with a submerged arc gun moved by a trackless tractor.

termittent ¼-inch fillets with 3/16-inch E6024 iron powder electrodes. Then workers form the big plate into a cylinder by wrapping it about a Ferris-wheel jig made of tubing. Next, they fit and weld octagonal diaphragm rings to the outside of the cylinder. These rings go every 15 feet on the tunnel, act like girders to transfer the tunnel load to cover plates when they rest on the bottom of the river. Wiley fabricates diaphragms in sections on the ground. Diaphragms have a web, a flange, and stiffener plates on both sides. Diaphragm stiffeners line up with shell stiffeners.

Diaphragm rings measure 37 feet across the flats.

MORE WELDING DETAILS

The web is 2 feet deep at the center, the shallowest point. To make sections, Wiley makes continuous ¼-inch fillets between flange and web. They weld the stiffeners with intermittent 3/16-inch fillets, 3 inches long and 3 inches apart. Wiley welds flanges with a Lincoln squirt welder moved with a trackless tractor. It welds flange fillets at 28 ipm.

INTERMITTENT FILLETS—34 IPM

The company uses the self-propelled gun to make stiffener fillets. And it makes them at a 34-ipm clip in spite of the gaps between welds. The operator does this with a fast drag between welds, then lets the gun control the speed during welding.

Cover plates weld to the sides and bottom of the diaphragms. Welds join the plates to diaphragm flanges and to spacer bars welded to the shell at the longitudinal stiffeners. These cover plates, and temporary end seals, make the tunnel sections seaworthy for their trip to the site.

The last fabricating step before launching is the welding of a layer of bar reinforcing mesh to the inside. With stick electrodes, operators weld studs to the shell, then the mesh to the studs. Finally Wiley pours 6 inches of concrete inside. This is a third of the concrete the tunnel will contain. • •

Use a PLASTIC filter for Arc Welding?

NO! NO!

• Until now, the answer has been emphatically *no!* But for the first time anywhere, a plastic plate is available that will filter the harmful ultra-violet and infrared rays of arc welding—and filter them to the same degree as the rigid standards set for glass in Federal specifications. Years of research have resulted in CESCO's new **PLASTI-WELD*** filters, which give arc welders these unusual advantages:

LARGE WINDOW AREA

In addition to the standard size 2" x 4¼", PLASTI-WELD FILTERS may be used in CESCO 401-16 and 403-16 helmets. These give 77 square inches of viewing area, *curved* for panoramic vision.

LESS FREQUENT REPLACEMENT

The slightly higher price of PLASTI-WELD filters is greatly offset by their ability to outlast glass, *as much as 6 to 1.* Less breakage from dropping, impact or thermal shock.

HIGHER VISIBILITY

Comments from hundreds of welders who field-tested PLASTI-WELD filters state that they give "unusual clarity—sharper definition of outline." Result: better output, higher quality work.

LIGHT WEIGHT

The 2" x 4¼" PLASTI-WELD filter, encased in its own rubber gasket, weighs less than one ounce, compared with two-and-a-half ounces for the average glass plate and cover glass. Regular lens gasket is not required. 7" x 11" PLASTI-WELD filter weighs only four-and-a-half ounces.

CESCO

FOR MORE INFORMATION about CESCO PLASTI-WELD filters, contact your nearby CESCO distributor or write our Chicago office

*Pat. Pending

CESCO FOR SAFETY

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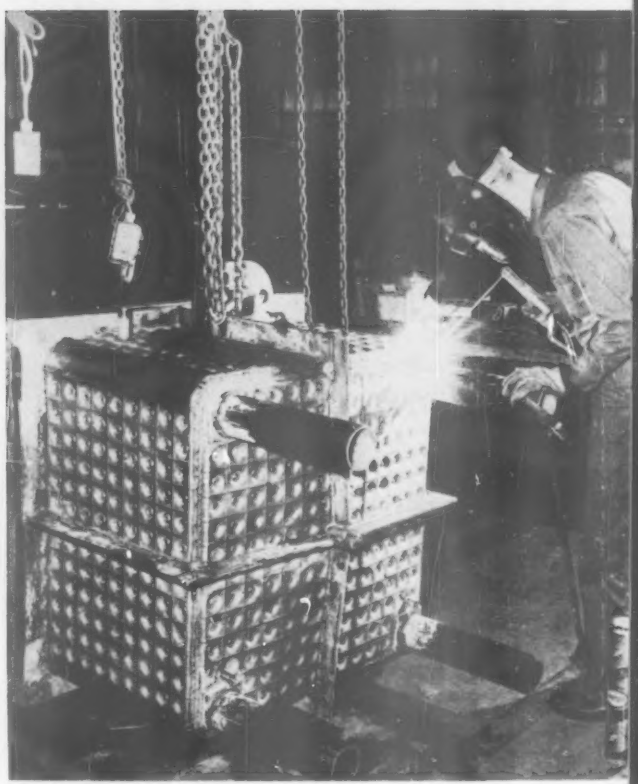
For More Information Circle No. 22 on Reader Service Card.

PLANNED WELDING procedures assure sound and economical construction of dimpled jacket reactors. Left to right: W. Friewald, sales manager; R. Perez; and M. Detloff, shop superintendent.



CARBON STEEL LEGS are welded to the reactor base. Ribs running around the reactor increase strength and provide maximum heat transfer area.

Welded dimpled jacket cuts reactor costs

IN BRIEF: Alloy Crafts Co., Delphi, Ind., uses a new design concept, dimpled stainless steel reactor jackets, to save money on material costs.

STAINLESS STEEL dimpled jacket construction may be the coming thing for reactors and for the chemical, drug, and food processing industries.

Dimpled jackets may be used for heating or cooling vessels by just about any means.

Dimpled jacket reactors cost 35 percent less than standard reactors. The all-welded dimpled jacket construction saves money because lighter gage metals withstand the same pressures as standard, heavier jackets.

For example, a conventional reactor requiring a ¼-inch-thick jacket can be made from 16-gage dimpled stainless and will meet ASME code specifications. On another reactor, the thickness of the inner shell was reduced from 11/16 to ⅜ inch.

Alloy Crafts Co., Delphi, Indiana, further improved the dimpled design by including a rib in the pattern. The rib adds strength, provides maximum heat transfer area.

One of the secrets of dimpled jacket fabrication at Alloy Crafts is a carefully planned welding procedure.

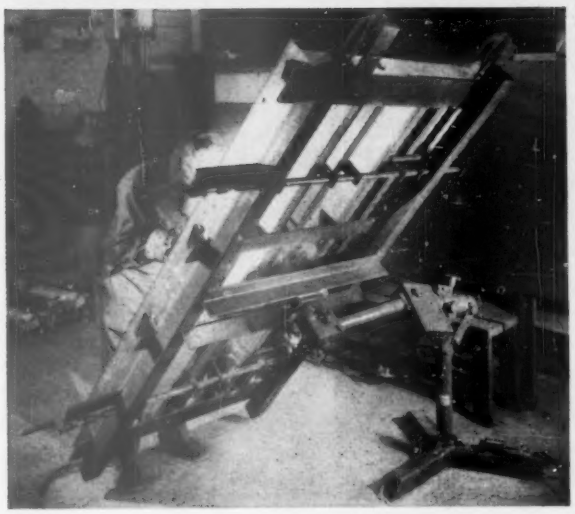
The first step in forming a dimpled jacket is stamping the dimple design into sheets of stainless steel. Alloy Crafts uses sheets 48 inches wide as the basic size. These may be cut into smaller sections and welded together.

The dimples are 2 inches in diameter and ½ inch deep with a ½-inch hole at the bottom of each dimple. The dimpled sheet, formed to the desired shape, is then placed in position on the reactor shell for plug welding (see picture). Alloy Crafts uses stainless coated welding electrodes supplied by Arcos Corp. The same electrodes are used for welding together the dimpled sheets.

Dimpled jackets can be formed to almost any size and shape, round, square, or irregular. Dimpled stainless steel panels also are being used flat as heating panels. You run steam between two panels in the same way plate coils are used in many processes today.

Stainless steel construction lowers maintenance costs. Dimpled jackets may be formed from most grades of stainless to meet any corrosion or sanitary requirements. • •

GREATER PROFITS with *Aronson* POSITIONING



Another Aronson UNIVERSAL BALANCE® Positioner is caught in the act of saving time, labor and money. This one is working for The United Manufacturing Company of Cleveland, Ohio in the fabrication of multipurpose munitions handling trailers for the United States Air Force.

•

The Air Force sets high standards and rigid delivery dates . . . both met by United Manufacturing Company with the help of Aronson positioners.

Aronson Universal Balance Positioners bring weldments into downhand position quickly and easily, resulting in welds of superior quality and appearance.

•

Aronson Positioners are designed to give long dependable service...the hallmark of all Aronson products.

•

ARONSON BUILDS THE MOST COMPLETE LINE OF POSITIONERS ...WITH CAPACITIES RANGING FROM 25 POUNDS TO 600 TONS

Universal Balance® Positioners • Bench Turntable Positioners
Gear Driven Positioners • Headstock-Tailstock Positioners
TracTred® Turning Rolls • Turntables • Fully Automatic Positioners
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ARCADE, NEW YORK

For More Information Circle No. 17 on Reader Service Card.

PORTABLE PRECISION IN ULTRASONIC WELD INSPECTION

THE NEW BRANSON SONORAY® MODEL 5

for inspection of raw materials going into weldments, as well as of the finished weld itself, goes with you to the job wherever it may be . . . brings laboratory precision into the field and permits the most accurate evaluations of internal structure possible today. Simplified controls, easily mastered by non-technical personnel, are centralized on the front panel. Skilled service by factory-trained specialists is always available across the nation.

PORTABLE: Weighs only 37 pounds complete.

SENSITIVE: Detects all cracks; instrument response adjustable to suit exact quality requirements of any job.

PRECISE: Completely locates, and determines extent of, internal discontinuities.

ECONOMICAL: Costs $2750.

•

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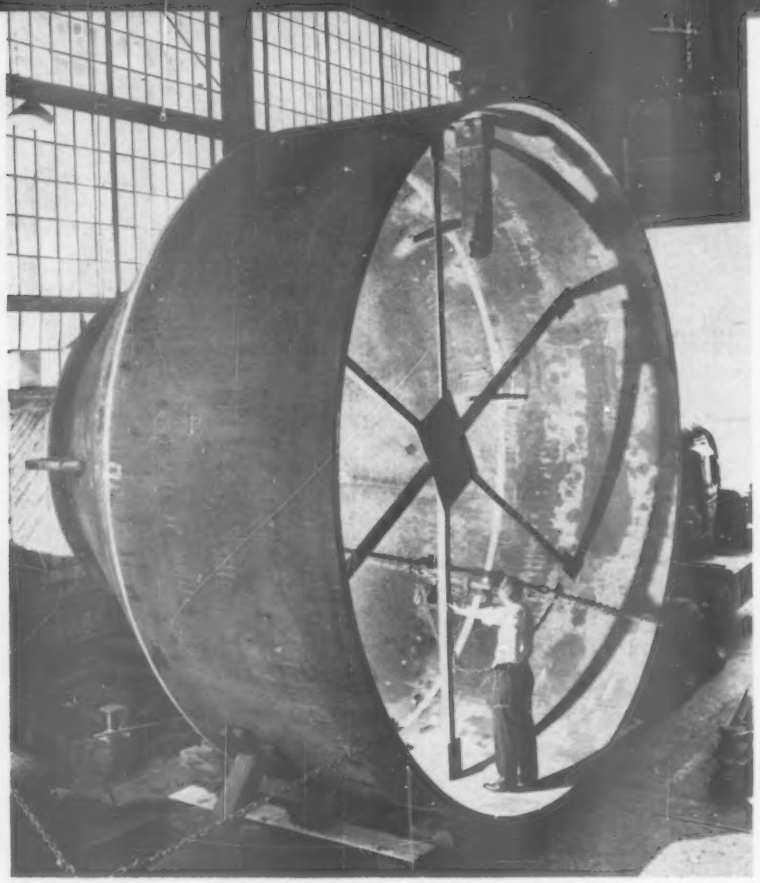
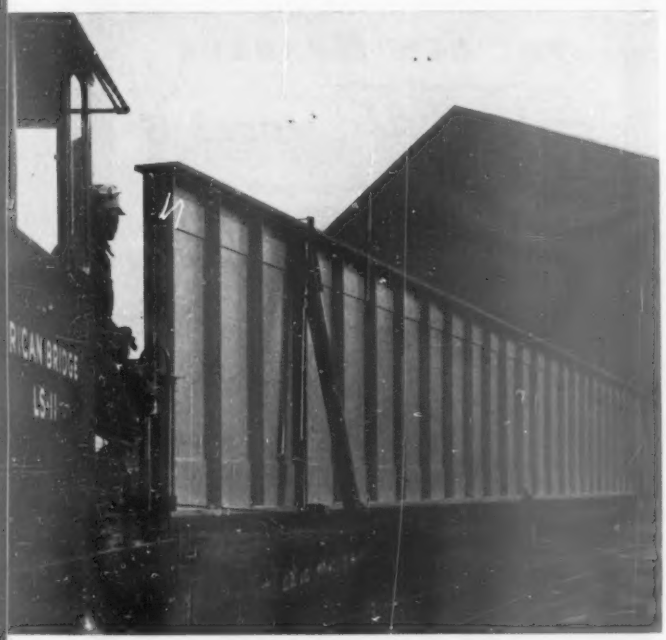
Fabricating king-size vessels



NEVILLE ISLAND, PA.: This 35-ton steel weldment in Dravo Corporation's structural steel shop is the upper half of one of two 150-ton-capacity furnaces for a new Stora-Kaldo oxygen steel-making facility at Sharon Steel's Roemer Works in Farrell, Pa.

The 18-foot-diameter weldment was fitted, tack welded, and then turned on its side for automatic welding. The two halves will be welded together at the site.



GARY, INDIANA: One of the largest all-welded steel plate girders in the world is moved on four railroad cars to the 160/210 inch plate mill now under construction at U. S. Steel's Gary Works. The huge A-7 carbon steel girder is 168 feet long, 16 feet high, and weighs 150-tons. It was fabricated at the Gary Plant of U. S. Steel's American Bridge Division.

SALT LAKE CITY: The first of many rugged steel launching tube liners for the Minuteman missile was shipped recently from Graver Tank & Mfg. Co.'s plant to the big Minuteman complex near Great Falls, Montana. The liner is 52-feet-long and 12 feet in diameter. It weighs about 30,000 lbs.—as much as seven large automobiles. Its heavy walls will enclose the Minuteman itself.

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PROGRESSIVE makes BIG fixtures

For many years Progressive has pointed the way to better production in American Industry with new ideas in welding equipment and fixtures.

Today Progressive's modern facilities and extensive experience offer dependable solutions to the many unusual problems confronting industry the world over.

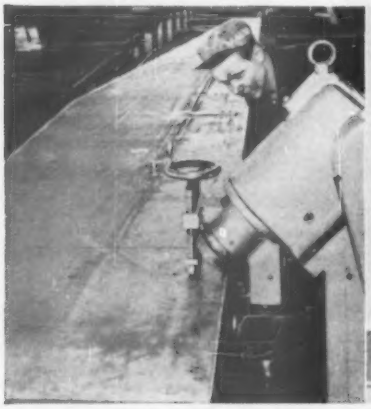
This gigantic (24′ diameter x 70′ length) booster assembly fixture for the Saturn missile, shown above, is a good example of Progressive's tremendous facilities and abilities.

Progressive's experience can save you time and money. Our engineers will gladly discuss your requirements.

THE PROGRESSIVE WELDER & MACHINE CO. 915 Oakland, Pontiac, Mich.

ELEVEN FEET PER MINUTE

FASTEST WAY TO BEVEL STEEL PLATE FROM ⅛″ TO 2″ THICKNESS



LARGE PLATES

Speeds up to 11 ft. per min. Large plates mounted on a table equipped with rollers, the Pullmax X-8 Beveler feeds the material automatically as it bevels the edge.

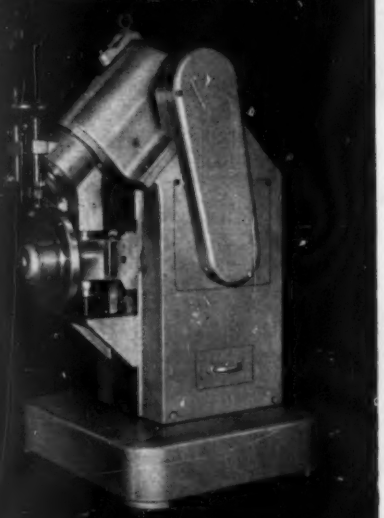
OR SMALL SEGMENTS

Cuts costs by 85%. Small pieces are usually very difficult and time consuming to bevel. Now, they are hand held and quickly run through the Pullmax X-8 Beveler.

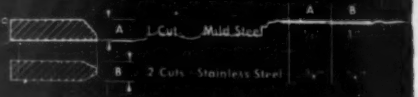
Write for literature—Have a FREE demonstration in your plant

PULLMAX X-8 BEVELER

AVAILABLE 30°, 37½° and 45° BEVELS



No more slow grinding, burning or planing a bevel on steel plate before welding. Now the Pullmax X-8 Beveler does the work faster and easier than any other method.



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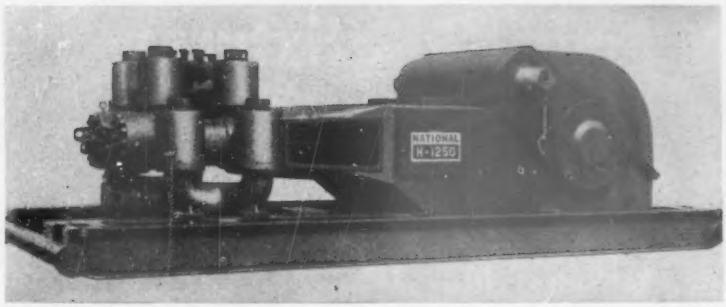

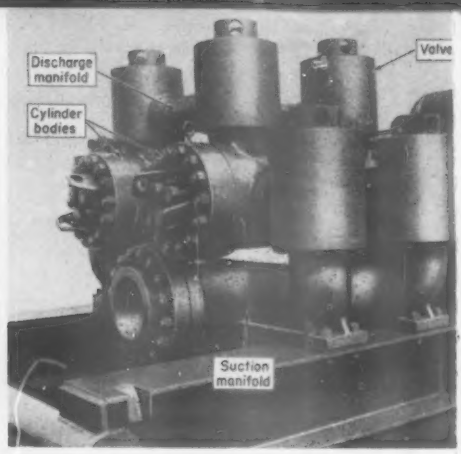

High pressure doesn't faze this pump—it's welded

IN BRIEF: The fluid stresses on the valve pots and cylinder bodies of a 1,250-horse slush pump are immense. This company welds forgings for critical parts and gets strength to spare.

SUBMERGED ARC WELDS between steel forgings, and between steel forgings and cast steel parts have brought new strength to the highly-stressed fluid end of heavy-duty slush pumps. National Supply Division of Armco Steel Corporation, Pittsburgh, changed to welded design to put more beef into their pumps. The pumps are used in oil fields to cool drill bits, 20,000 feet down, with a mud solution.

The company welds forged valve pots to forged fluid cylinder bodies with automatic submerged arc. It also joins a cast steel discharge manifold to the forged parts with submerged arc welding. Since these welds are highly stressed, the company takes exceptional care in making them. Then it stress relieves the welded units and X-rays all of the welds. This pro-

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FOR OBTAINING MAXIMUM POWER WHEN CUTTING HARDER MATERIALS

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PREVENTS GALLING AND PROLONGS LIFE OF PUNCH AND DIE

PATENT PENDING

BUILT-IN CIRCUIT BREAKER
PROTECTS MOTOR AND GEARS WHEN MACHINE IS OVERLOADED OR WHEN PUNCH AND DIE GET TOO DULL FOR EFFICIENT OPERATION

QUICK CHANGING PUNCH AND CARBIDE DIE AT NO EXTRA COST

CUTS ¼" STEEL • ⅜" ALUMINUM

The MODERN GOBBLER cuts 1/4" mild steel, 3/8" aluminum & 7/32" stainless steel. No distortion, bending or curling. Ideal for shipyards, welding shops, kitchen equipment builders, heavy duty metal fabricating shops.
MODEL SN-40 ELECTRIC - 2½ HP 15 Amp. AC-DC - Universal Motor
WEIGHT - 24 lbs. net

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For More Information Circle No. 55 on Reader Service Card.

FORGED VALVE POTS submerged arc welded to forged cylinder bodies (opposite page) effectively resist high fluid stresses. The manifold is of cast steel because it doesn't have high fatigue stresses.

cedure assures welds that are at least as strong as the parent metal. National also tests the fluid units hydrostatically—at 8,000 psi.

Forgings give the fluid end of the 1,250-input-hp slush pump the strength and the soundness it needs to withstand the high fluid pressures. The forgings resist fatigue, and this means less maintenance on the pump. The reason: forging orients grain structures so that there is a minimum of directional weakness in a part. By contrast, machined parts have much more directional weakness, because machining cuts across the direction of rolling, making some areas weaker than others.

National makes slush pump manifolds of cast steel. Castings aren't as strong as forgings, but they're strong enough for the job. The company has had no trouble with cast manifolds.

The slush pump's main frame is also a weldment. National builds frames with steel plates, structurals, and steel castings. • •

Hold on there! Back up a bit: you just rushed by some pretty important information. Before you pass this copy of WELDING DESIGN & FABRICATION on the next reader check it over once more. Did you spot the New Products pages? How about selection of free data books and catalogs? The handy Reader Service card will bring you details on any item. Just fill it out and mail it.

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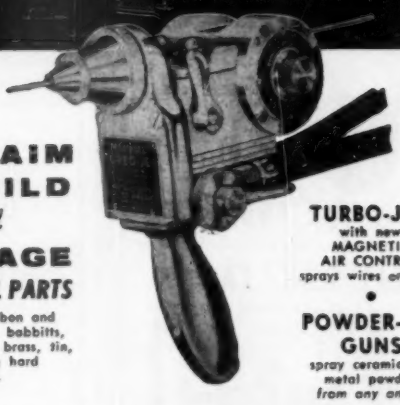

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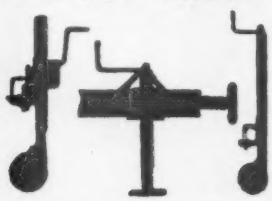

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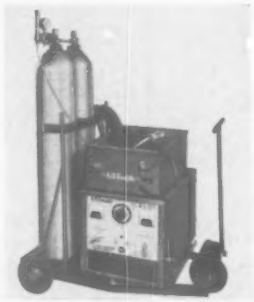
Circle No. 33 on Reader Service Card.

NEW PRODUCTS

Portable Radioisotope Unit

A completely self-contained, portable radioisotope unit called the 'Pipeliner" has been developed by Picker X-Ray Corporation for inspecting atomic submarines to welded pipelines. The Pipeliner offers 10-, 20-, or 30-curie power, can radiograph 2-inch-thick steel, and handles 1-inch steel in less than a minute. It uses Iridium 192 housed in a special lead-tungsten alloy It can be operated remotely from 25 feet by simple dry cell control, and A.E.C.-recommended levels are maintained on radiation leakage.

Circle No. 200 on Reader Service Card.



Semi-Automatic Welding Equipment

A complete family of semi-automatic welding equipment, including a new 250-amp constant-potential power source, two new wire drive options, and three new gun assemblies, has been introduced by A. O. Smith's Welding Products Division. In various combinations, the new and established equipment can be matched to perform all semi-automatic welding jobs on a complete variety of materials. Optional for use in conjunction with an established 600-amp source, and placed in series with that unit's d.c. output, is a Stellarweld reactor for adjusting arc characteristics to the most critical needs of varying applications.

At the heart of A. O. Smith's semi-automatic welding system is a basic wire drive package, with modifications of accessory equipment to fit all semi-automatic jobs. An electromechanically governed motor is used for constant-speed feeding service, avoiding maintenance by an electronic technician.

The new welding gun assemblies range from a light hand torch for feeding small diameter wire on light-gage welding to an extremely heavy-duty water-cooled gun for high-current gas-shielded welding in deep grooves.

Circle No. 201 on Reader Service Card.

Gas Welding and Cutting Outfits

Two new oxy-acetylene welding and cutting outfits have been introduced by Linde Company, Division of Union Carbide Corporation. The new units are called the Purox "One Hundred" and "One Thirty." Features of the 'One Hundred" outfit include the lightweight Purox W-200 Welding Torch and the compact CW-200 cutting attachment. Three welding heads for welding metal up to 3/8-inch thick and a cutting nozzle for slicing 2-inch steel are also supplied. The "One Thirty" outfit features a medium-range Purox X-201 Welding Torch and three welding heads for welding up to 1/8 inch (capacity, up to 1 inch) and a rugged CW-202 cutting attachment with a nozzle for cutting up to 4 inches (capacity, up to 8 inches).

Circle No. 202 on Reader Service Card.

New Steel Is Tough

A quenched and tempered alloy constructional steel with weight-saving strength, great durability under punishing loads, and excellent weldability has been developed by Sheffield Division, Armco Steel Corp. The SSS-100 alloy steel is ASME-approved for use in the construction of welded pressure vessels and can be used in bridges, heavy construction equipment, fab-

ricated structural shapes and other applications calling for a combination of strength, toughness and weldability.

Sheffield SSS-100 is available in plates from 3/16 to 2 inches thick, in blooms and billets for forging, and heat-treated bars.

Circle No. 61 on Reader Service Card

Light-Weight Welding Torch

Ability to turn nozzle 360 degrees and keep the handle (and operating switch) in the most efficient operating position is one feature of the new 22-ounce air cooled straight-through torch introduced by Westing-Arc Department, Westinghouse Electric Corporation. The torch, Model HT-1, is the business end of a new semi-automatic 200 amp portable welding system just introduced by Westinghouse. Rated 100% duty cycle at 200 amps, the lightweight gun accommodates wire sizes .030 to .047 inch and uses CO_2 in the reactor and spray ranges; argon or argon gas mixes in the reactor range. The gun and system were developed to provide better efficiency in production welding of light gage mild and stainless steels, and aluminum.

Circle No. 203 on Reader Service Card.

Bench Welder

The first line of standard Spike Power bench welders designed and built specifically for precision welding of transistors and minute electronic components is announced by National Electric Welding Machines Co. Known as National's "S" series, the line is composed of four models varying in work capability and designated as size O; S-1; S-2; and S-3. All but size O are also available with standard welding controls. The models also vary in transformer and firing tube capacity and in weld pressure delivered from a low of two pounds for size O to a maximum 500 pounds on the S-3 model.

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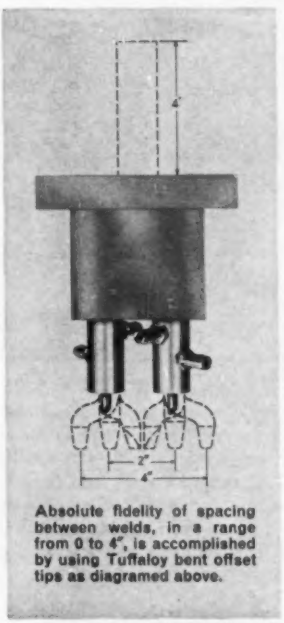
THE TRADEMARKS TO TRUST

AIRCO

Reduce Welding Time up to 50%

Double-Barrelled Tip Holder Makes Two Equal-Pressure Welds



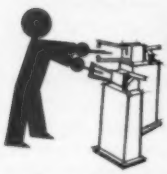
Absolute fidelity of spacing between welds, in a range from 0 to 4", is accomplished by using Tuffaloy bent offset tips as diagramed above.

*Airco trademark

The TUFFALOY Equa-Press* Dual Holder makes two spot welds at once, and makes them precisely alike. Upon contacting the work piece, the forging pressure is automatically equalized between the two electrodes, regardless of minor variations in work thickness or electrode wear (up to 3/16").

The two tip-holding barrels are sliding pistons, whose movements are controlled by a mechanical equalizing device sealed in the housing. Maximum conductivity is maintained through the copper-alloy working parts, and water coolant fittings are provided.

Models are made for mounting in a welder arm (above) or for bolting to a press welder platen (left).



Doc Tuffy says . . . you'll almost double your output of closely-spaced welds without adding a man, with the TUFFALOY Equa-Press Dual Holder!

There is an AIRCO or TUFFALOY distributor near you. Call him and ask to see the Equa-Press Dual Holder. Ask him too for the TUFFALOY Catalog . . . it makes correct resistance welding electrode specifications easy.

AIRCO

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For More Information Circle No. 5 on Reader Service Card.

High Strength Nickel Steels

A new family of high strength nickel steels, called Maraging steels, have been developed by The International Nickel Company, Inc. The tensile strength of 18% nickel maraging steel is 140,000 psi, but increases to 250,000-275,000 psi after maraging 3 hours at 900 F. It is readily hot and cold worked. It is weldable in the fully heat-treated condition without preheating, requiring only a post-weld aging treatment to fully restore properties in the heat-affected zone. It is machinable as annealed and in the fully-aged condition.

20% nickel maraging steel is martensitic as annealed and attains high strength by a single aging treatment. Quenching is not required in processing. It is machinable and can be cold worked and formed. Limited machining is also feasible in the fully heat treating condition. Sound welds can be made by numerous arc processes, using electrodes with approximately the same composition as the base metal. Preheating is not required. Post-weld aging at 850-900 F is required.

25% nickel maraging steel is partially austenitic as annealed. It is soft and readily workable with a high level of strength combined with good notch strength produced by simple heat treatment or cold work and aging. It can be rough machined in the annealed condition and light finished machined after aging. Sound welds can also be made in this alloy, but post-weld treatment is required.

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Model B (Wet or Dry)
Dependable. Economical. Easily handles 5" rounds, 10" flats.

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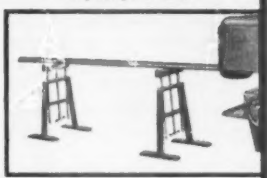
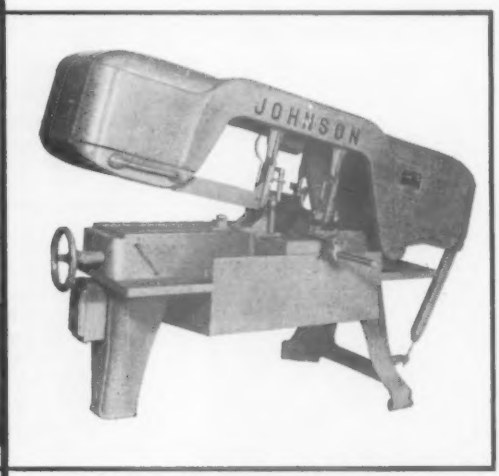
Speaks for itself in ANY SHOP!

Model M (Mobile).
Rolls to the job, inside or out.
Capacity: 5" x 10"



Johnson Adjustable Stock Stand.
Provides rigid, safe work support.



The Big Model J. (Wet or Dry) Fast. Tough. Accurate.
Capacity: 10" rounds, 18" flats

The big, dependable Johnson delivers more saw for less money. It easily and accurately handles anything in your stock pile: rods, angles, tubes, heavy rounds, irregular shapes, and flats.

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For More Information Circle No. 39 on Reader Service Card.

Speed-X Positioner

A versatile, medium duty welding positioner capable of handling and rotating 500 lbs. at an eccentricity of 6 inches from the center of the turntable, is available from Stahl Equipment Company. The machine is portable, but has sufficient stability and balance not to fall on its face when the work piece is tilted to a 90° angle, even with 12 to 18 inch eccentricity within its load limit. Tilting is manual from 0 to 90° at 15° increments. A stepless speed control plus a high and a low range toggle switch is on the control panel.

Circle No. 206 on Reader Service Card.

225 Amp Arc Welder

An all-purpose 225 amp arc welder, claimed the lowest cost unit of its rating, has been introduced by Bren/Weld Corporation. It is ruggedly built and is completely equipped with a full set of accessories and ready to weld. Model 225-W operates on regular 230 volt a.c. and has a 12 station current range of 30 to 225 amps. Uses any type of a.c. electrodes including low-hydrogen and stainless steel. Duty cycle is 20 percent.

Circle No. 207 on Reader Service Card.

Light-Weight Welding Helmet

A light-weight inexpensive welding helmet made of fiber is now available from the American Optical Company's Safety Products Division. The 13-ounce helmet features a new aluminum plate holder and has adjustable friction joints and adjustable headgear. Seams are widely overlapped and coated with a rubber sealant to prevent light leakage. This helmet is recommended for light welding, intermittent use, and for use in confined quarters.

Circle No. 208 on Reader Service Card.

Single-Stage Regulators

A new series of all-purpose, single-stage industrial gas regulators featuring inverse type seat design has just been announced by Air Reduction Sales Company. With this new design, the Airco 9100 Series oxygen and acetylene regulators provide slightly rising pressure, as cylinder pressure falls off. Through a unique diaphragm design, the performance of a large diaphragm area is provided without making the regulator body excessively large. Other operating advantages are rugged construction, simplified maintenance, and extended life. The new regulators are available in five models.

Circle No. 209 on Reader Service Card.

Natural Gas Cutting Tips

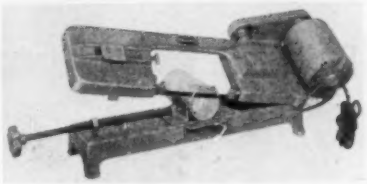
A new line of low pressure natural gas cutting tips which provide a wider range of flame adjustments for faster, cleaner cutting of thin plate steel has been added by the Harris Calorific Company. Identified as the Series 6290 NX, these tips are used with Harris injector-type cutting torches and cutting attachments. The new tips are available in three sizes, 6920-000NX, 00NX, and 0NX.

Circle No. 210 on Reader Service Card.

Extrusion Coating

Trucote #101 is the first of a new line of flux coated silver brazing alloys manufactured by All-State Welding Alloys Company, Inc. Trucote #101, a high strength silver brazing alloy, uses an anhydrous and hygroscopic flux. It does not chip or char but continues to provide excellent cleansing and wetting action to the end of the rod. Trucote can be used wherever silver brazing alloys are used. Packaging is in handy see-through shatter-proof plastic tubes with easy to open plastic caps. Bulk packaging for larger industrial users is also available.

Circle No. 211 on Reader Service Card.



Portable Band Saw

A portable, horizontal metal-cutting band saw with cutting accuracies of stationary equipment, has been introduced by Griscer Industries, Inc. Named "Little G", the tool weighs only 42 pounds, including ¼-hp motor. It uses a standard ½ x .020 x 59 inch blade, with accuracies within .005 inch on a 3 inch cut. Rectangular capacity is 3½ inches by 6 inches.

Circle No. 212 on Reader Service Card.

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As an induction coil **in preheating and stress relieving, Ni-Coil provides for easy positioning on work for best results, reduced electrical losses, elimination of edge burning, other important advantages.**

As flexible conductor between moving parts, **Ni-Coil is less expensive, less bulky and easier to install than braided shunts, protects against breakdown at terminal ends, minimizes heating.**

Made in sizes up to 500,000 C.M. . . .
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. . . CUT METALS* RIGHT ON THE JOB!

No matter the kind of metal or shape to be cut, FENWAY NIBBLERS (air powered or electric) operate with a cutting action which displaces the metal without distortion on both sides of the sheet: insures finished smooth edge, no chipping, no binding, no curling, no flaking . . . Cuts inside circles, squares, odd shaped holes on a per job or production line basis—saves time and materials in every application . . . Portable, light in weight, (8-20 pounds depending on model) —safe, easy to handle, proved durable in critical operations, minimum maintenance, guaranteed unconditionally.

***THE FENWAY NIBBLER CUTS: All non-ferrous metals, copper, brass, aluminum, etc. 10 gauge stainless steel and lighter; 8 gauge mild steel and lighter; tough pitch or asbestos coated corrugated steel ¼" cold or hot rolled steel and 5/16" aluminum.**

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For More Information Circle No. 30 on Reader Service Card.

SPECIAL MONEY-SAVING OFFER!

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PUROX 130 ONE-THIRTY OUTFIT

$148.07 value for only $130.00

YOU SAVE $18.07!

The PUROX "130" meets any shop's medium-range oxy-acetylene needs—on production lines, in garages and repair facilities, on pipe welding jobs, in tool, die, maintenance departments.

EASY TO USE—No need to readjust regulators when you switch jobs.

RELIABLE—flame won't sputter or pop, regardless of size, valve-throttle or regulator settings.

The PUROX "130" is lightweight, easily portable, economical to buy and use. Welds up to ⅜", cuts up to 4".

PUROX ONE HUNDRED (100) OUTFIT—*for light welding and cutting!* You pay only $100.00 for a $114.62 value—and save $14.62! Ideal for light-duty production, repair, maintenance work. Use the "100" on aircraft, small parts, light machinery, sheet metal assemblies. Extra small and easily portable (entire unit weighs less than 10 lbs.). Welds up to ⅜", cuts up to 2".

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Your nearby LINDE distributor has both of these PUROX kits in stock now. For his location, check your Yellow Pages. Or write Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

LINDE COMPANY

UNION CARBIDE

"Linde," "Purox" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

For More Information Circle No. 43 on Reader Service Card.

New Welding Wire

The newest manufacturer of welding wire is National-Standard Company. They will market it through regional distributors. The first welding wires to be marketed will be stainless alloy Types 308, 309, 310, 316, and 347. It will be packaged in one-pound disposable spools and 25-pound pressed board disposable spools for automatic welders as well as in 3 foot rods for hand-held welders. Reels and rod bundles will be individually cartoned. Wire diameters will range from 0.035 to 0.187 inches.

Circle No. 213 on Reader Service Card.

New Ceramic Cup Design

A special grade ceramic cup designed with internal and external radii is now standard equipment on all Falstrom Controlled Angle Torches for tungsten inert-gas, arc welding. This special Uni-Flo cup is designed to reduce cup breakage caused by thermal shock and to surround the electrode with an even, uniform gas flow. These design changes result in more economical TIG welding.

Circle No. 214 on Reader Service Card.

Anti-Spatter

A new anti-spatter compound, called SPATTER-X, has been announced by Northland Chemical Corporation. Extensive field tests have been conducted on this new product. Northland SPATTER-X is a harmless, water soluble compound which prohibits the adhesion of spatter, eliminates grinding operations and resultant pit marks.

Circle No. 215 on Reader Service Card.

Fire Extinguisher Holder

The indispensable fire extinguisher is right at the welder's elbow with an extinguisher holder that fits on Singer portable screens. It attaches quickly with two wing nuts to the lower bar of the screen. Sliding sleeves and a set screw enable it to hold extinguishers up to 8-inch diameter. Travels right along with screen when moved from job to job.

Circle No. 216 on Reader Service Card.

Tungsten Carbide Hardfacing

Electric arc application of tungsten carbide hard facing has been improved by Kennametal Inc. by development of a new solid-core Kenface Arc Rod KT-200. This rod is particularly recommended for large pieces where gas application is not practical. The deposit flows on easily with extremely low porosity and minimum heat checking. The KT-200 rod is suitable for either bead or wash pass application. AC application is recommended, but DC reverse polarity (160-200 amp, 16-20 volts) can be used. Rockwell C of deposits ranges from 58 to 63 for a single pass and from 60 to 65 for double pass.

Circle No. 217 on Reader Service Card.

Abrasive Blasting

An abrasive blast nozzle with instant operator control has been developed by L. C. Nesham Products. The nozzle is held under pressure at all times and completely eliminates waiting for the pot to pressurize. Called Abrasive-Miser, it requires no signalling to the pot tender. It will fit onto any blast hose in minutes.

Circle No. 218 on Reader Service Card.

ANYBODY'S PRIVILEGE

You may request more data on any item in this magazine that has a Reader Service Number regardless of whether or not you are the subscriber to whom the magazine was addressed.

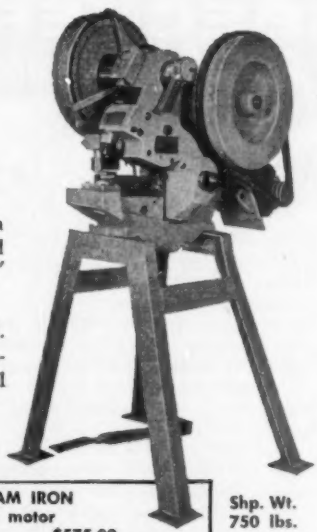
Large and small Fabricators of steel and ornamental iron swear by it ...

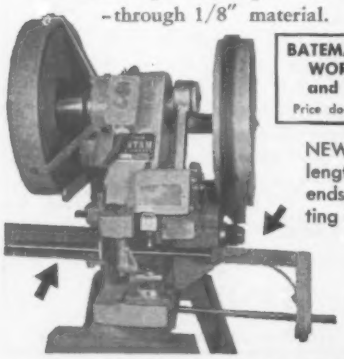
BATEMAN BANTAM IRON WORKER

The Bantam cuts and punches fast and clean ... no grinding necessary. It's versatile, and saves time and labor! Cuts 2" x 2" x 1/4" angle and 1/4" x 4" flats.

Punches 1/2" hole through 1/4" material. Operates by hand or foot, uses 3/4 hp motor (1750) rpm., powered with flywheel and drive gear.

The Coper will cope 1-1/4" -through 1/8" material.





BATEMAN BANTAM IRON WORKER, with motor and stand $575.00
Price does not include Blades, Punches or dies.

Shp. Wt. 750 lbs.

NEW ACCESSORIES: Gauge for cutting to length, Guide for Flat Bars for cutting on ends, and Angle Iron Trimming Guide, for cutting at a 45 degree. Write for details.

WRITE TODAY for complete information and name of nearest distributor

Bateman Foundry & Machine
MINERAL WELLS, TEXAS

For More Information Circle No. 74 on Reader Service Card.

—your LINDE distributor!

Advice is only as economical as it's correct—especially when the subject is welding. The advice you get from your LINDE distributor is sound . . . he knows LINDE, and LINDE knows the subject of welding inside and out. What's more, he knows your special needs, because he's an independent local businessman, familiar with your area and it's industry.

Talk over your welding problems with him. You'll find his knowledge as complete as his stocks of equipment. And because LINDE has been a leading pioneer in welding for more than 50 years, his is backed up by authoritative technological facilities for getting fast, accurate information on problems that are out of the ordinary.

In fact, you can phone your LINDE distributor for quick delivery of both equipment and advice. Look him up in your classified directory, or write for his address to Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada,* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

Your LINDE Distributor

"Where One Call Gets It All"

LINDE COMPANY UNION CARBIDE

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Circle No. 44 on Reader Service Card.

WELD WITH Tipaloy

YOUR Resistance Welding Electrode NEEDS Are OUR Business!

Whether it be:
TIPS:
ROD or BAR:
SEAM WELDING WHEELS:
FORGINGS:
CASTINGS:
HOLDERS:
ADAPTERS:

SPECIAL WELDING DIES or FIXTURES: TIPALOY *has them.*

BUY TIPALOY and save money!

TIPALOY can supply you with:
RWMA Class #1, Tipaloy #100
RWMA Class #2, Tipaloy #130*
RWMA Class #3, Tipaloy #200
and other RWMA classes of alloys to fit your needs.

It is unwise to pay too much, but it is worse to pay too little!

Use TIPALOY and get 30% to 100% more performance for your money than you are now getting.

BUY TIPALOY and get TIPALOY QUALITY

Send your trial order today

*TIPALOY #130 cast and processed under our patents.

FREE: Write for your copy of Tipaloy's comprehensive new catalog.

Distributors and Representatives. Write for complete information about available territories.

REPRESENTATIVES IN PRINCIPAL CITIES
Tipaloy INC. 1435 E. MILWAUKEE AVE. DETROIT 11, MICHIGAN

Circle No. 67 on Reader Service Card.

Battery Charger-Tester

A new "sealed-unit" battery charger/tester that will automatically fast charge, slow charge in parallel, and test analyze, has been announced by Marquette Manufacturing Co. The new charger/tester, Marquette Seal-A-Matic Model 330, features: electronic semi-conductors, transformer, lifetime Silicon rectifier, and control relays hermetically sealed in oil for lifetime protection.

Circle No. 219 on Reader Service Card.

Improved Welder/Power Plant

The AEA-200-L gasoline engine driven welder/power plant is now powered by a special 15 Onan air-cooled engine according to Miller Electric Manufacturing Company. Welder output is increased to 250 amperes—225 amperes at 100% duty cycle. This model also provides 1 KW of d.c. while welding and, as a stand-by power plant, delivers 5 KW of 115/230v a.c. New engine features include twin mufflers, automatic spark advance and rotators on all valves. Also, valve and seats are now Stellite faced.

Circle No. 220 on Reader Service Card.

Metal and Ceramic Spraying

New models of powder metals and ceramic spraying equipment have been introduced by Metallizing Company of America, Inc. Model No. AL-205 is capable of depositing such ceramics as

BECKER
Keen-Cut Electrodes
for use in
CARBON ARC-AIR JET GOUGING

KEEN-CUTS—for the best characteristics of carbon and graphite in a carbon arc cutting electrode. Higher current capacity ... longer life ... shorter cutting time ... greater material removal ... smooth surface gouge ... controllable accuracy ... hot stable cutting arc ... elimination of smoke and gases.

And they're low in cost. Try BECKER KEEN-CUT ELECTRODES—black or copper coated, standard diameters, 12" lengths in 150 to 1400 amp. range—for the most efficient, labor-saving electrode in carbon arc/compressed air cutting.

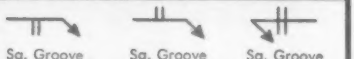
A COMPLETE LINE OF CARBON AND GRAPHITE WELDING SUPPLIES—carbon and graphite electrodes, carbon rods and plates, welding paste, graphite cores and chills, graphite powder and particles of any mesh.

Write for Catalog

BECKER BROTHERS CARBON CO.
3442 South Laramie Ave.
CICERO 50, ILLINOIS

Circle No. 19 on Reader Service Card.

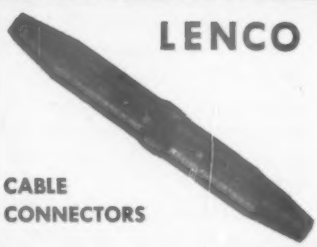
Symbols for Welding



Sq. Groove Weld Arrow Side | Sq. Groove Weld Other Side | Sq. Groove Weld Both Sides

Symbol of Quality

LENCO



CABLE CONNECTORS

Save wear on welding cables. LENCO Cable Connectors let you use just the amount of cable you need for the job. Add on cable—take off cable with ease. Made of high conductivity brass with tough Neoprene covers. Two sizes to fit all sizes of welding cable.

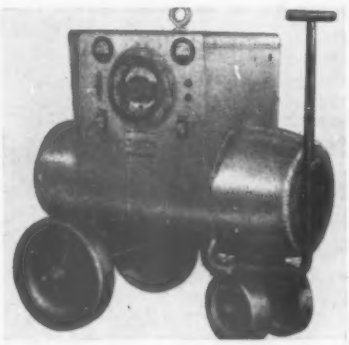
FREE Large 8½x11 chart shows symbols for arc, gas and resistance welding.

WRITE TO:
LENCO, INC.
350 West Adams Jackson, Mo.

Circle No. 41 on Reader Service Card.

Zirconia and Aluminia at greater spraying speeds, resulting in harder and more impervious coatings. Model No. CA-305 sprays up to 16 lbs. per hour of hard-facing alloys, and is capable of spraying a broad line of commercial metal powders. Improved bonding techniques are used in this process.

Circle No. 221 on Reader Service Card.



New Visored Panel Welders

A protected control panel is a feature of the new line of dc motor generator arc welders announced by Hobart Brothers Company. In the new design, meters and controls are protected by a visor which extends out over the entire control panel. All models have multi-range dual control, with 10 main ranges of welding current and 100 steps of volt-ampere adjustment in each range. Other controls include remote control, polarity switch and motor start-stop-reset buttons. Meters and portable mounting are optional equipment. Rated at 60% duty cycle, 200, 300 and 400 ampere models are available for either 50 or 60 cycle operation.

Circle No. 222 on Reader Service Card.

Electronic Welding Control

A new electronic welding control which provides remote fingertip control of welding machine amperage is now available from Mars Industries, Inc. A touch of the button on the welding rod holder kit—and the amperage on the machine, located a convenient distance away, is increased or decreased. This new welding control will help reduce welding spatter with closer control of welding heat; promote sounder and stronger welds; and can result in substantial time savings by eliminating trips to the welding machine for amperage adjustments. Simple to install—simple to operate—all in a compact package of motor, mounting screws, and premolded welding rod holder with 25 feet of welding cable.

Circle No. 223 on Reader Service Card.

Check-Free Hard Facing

Hard, tough, and completely check-free deposits are provided by a new electrode for submerged-arc hard facing announced by Coast Metals, Inc. Multi-layer as well as single layer overlays made with this electrode range from 50 to 54 Rockwell C as deposited. They are machinable with carbide-tipped tools and increase in hardness to 62 Rockwell C when machined. Known as Alloy No. 97 and furnished as coil wire, the new electrode is intended for general purpose work.

Circle No. 224 on Reader Service Card.

IN 1936, MORT CLARK, then Vice-President of the world's largest sign manufacturer, wanted a welded galvanized sign frame. Every welder manufacturer said it couldn't be done . . . Mort Clark did it, received a check and certificate of achievement from the Lincoln Welding Foundation—and

MORT CLARK'S **GALV-WELD** ALLOY ORIGINAL & GENUINE

WAS BORN

The Navy didn't believe, tested it 3384 hours in salt spray (100 hours is normal), then approved it. Westinghouse reports Galv-Weld roof sign, installed 1936—still perfect in 1959—23 YEARS LATER!

TIME PROVEN — MODESTLY PRICED
WHY EXPERIMENT?

Regalvanizes corrosive seams and areas where galvanizing is burned away by welding, skipped in hot dip galvanizing, or abraded in fabrication.

Eliminates corrosion areas produced by welding, so that weld will stand up under paint, WITHOUT rust, as on ornamental iron. Simply use residual heat from welding, or reheat, wire brush, and apply. No fluxing—No fumes.

Makes every welder a galvanizer of small weldments or parts. Repairs chipped porcelain, rusted appliances, rusted auto, truck or trailer bodies, frames, fenders, or other steel products. Can be readily refinished to match surrounding surface.

Ideal for pipe joints, galvanized structures, water and fuel tanks, duct systems, cold storage lockers, sinks, drains, washers, towers, steel buildings, railings, etc.

Some distributor franchises still available. Cash in on consistent campaign now running in 10 national magazines.

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Circle No. 31 on Reader Service Card.

NATIONAL CARBIDE TOPS IN QUALITY!

All you want—when you want it in the **RED DRUM.**
All sizes, in quantities from 2 lb. pkgs. to 5 ton hoppers.

Calcium carbide is a product of:

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A Division of Air Reduction Company, Incorporated
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For More Information Circle No. 3 on Reader Service Card.

Toxic Fume Protection

Above-the-shoulders protection for the welding operator has been announced by Jamieson Laboratories. With the Jamieson Whitecap model WL-1, air is supplied to the wearer through use of either the exclusive Jamieson centrifugal filter/blower or a special hose adapter connecting the system to in-plant compressed air. A high-efficiency extra fine particle filter removes toxic fumes such as beryllium, cadmium, lead, and zinc, as well as all flux fumes. Additionally, a chemical filter is available for providing ozone protection. The flexible, lightweight, insulated hose delivers the air to the lightweight helmet of double-shell fiberglass construction, which meets or exceeds Federal Specifications for a Class A head protective device.

Circle No. 225 on Reader Service Card.

Pencil Probe Welding Tool

A pressure sensing pencil probe type welding handpiece has been added to the line of electronic welding equipment manufactured by Hughes Aircraft Company's Vacuum Tube Products Division. The new handpiece, designated the VTA-43, makes small, pin-point welds from one side. Sold as a set, the VTA-43 includes both a pressure sensing weld probe and a ground probe. The probe is adjustable to fire at preset pressures ranging from one-half to five pounds, permitting quality welds on hard-to-get-at thin metal applications.

Circle No. 226 on Reader Service Card.

Dial Thermometer

A line of new magnetically attaching bi-metal dial thermometers has been released by Industrial Service Company for temperature measurement on ferrous materials. Three styles are available: thermometers for temperature measurement only, thermometers with maximum reset hand, and thermometers with electric contactor to permit "on-off" temperature control with electric resistance or induction heating. The thermometers are available in various temperature ranges from −60°F to +700°F and have accuracies of better than 2 percent.

Circle No. 227 on Reader Service Card.

Surface Resistance Tester

Cleanliness of aluminum or other metals can be checked prior to welding by measuring the surface resistance in microhms with a new instrument by J. W. Dice Company. The cleanliness test can be performed on coupons cut from the metal and inserted in the test jig or directly on the material at the welder head with welder current off. The test jig is hydraulically operated and its capacity range of 0-2000 lbs. permits duplication of the actual pressures used for the welding operation.

Operates on 115 volts, ac. Meets Milspec 6858-A.

Circle No. 228 on Reader Service Card.

QUIK®-HEAT

up to 2200° F.

CLEMENTS

Cadillac

MODELS K3 & M2

BLOWTORCHES

Here are rugged, high efficiency blowtorches that speed up all types of heat treating and production operations. These two Clements Cadillac Blowtorches provide heat up to 2200°F. in seconds and are fully portable. With the Clements Cadillac model K3 or M2 you can bring the torch to the work instead of the work to the torch as in fixed installations. Furnished fully equipped with 20 ft. of Underwriters' Laboratories and Canadian Standards Association approved 3-wire cable with plug, 10 ft. of gas hose with fittings ready to attach to your gas line and with sturdy, high stability stand. Easily adjustable for height and direction of torch.

Operates on natural, manufactured, or LP-gas.

CLEMENTS MFG. CO.

6646 S. Narragansett Ave., Chicago 38, Ill.

SINCE 1910

INDUSTRIAL PRODUCTS DIVISION

Circle No. 23 on Reader Service Card.

QUIET . . .

CHEMCLEAN

Coppa-Dip at work!

Restore lustre to old Copper and Brass. Non-fuming Chemclean "Coppa-Dip" removes oxide and scale, imparting a tarnish resistant, bright golden finish to the surface. Rejuvenated stock allows immediate transfer of inactive inventory into saleable merchandise.

the original . . . the only

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INDUSTRIAL CHEMICALS AND SPECIALTIES

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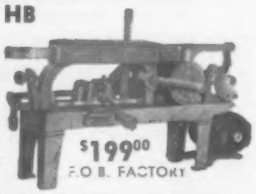
KELLER *POWER* HACK SAWS

5 Sizes . . . 12 Models

Cut Cutting Costs

MODEL 1 HB

5" x 5"

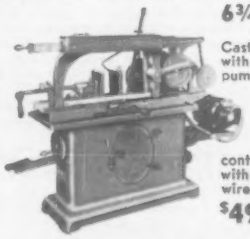


A rugged bench saw with cast base and legs, 45° swivel vise, 2 speeds, Oilite bearings, adjustable bronze bearings in saw frame. Complete with ½ h.p., 110 V. motor, switch, wired ready to go. Also available in floor model, No. 1 HF.

$199.00 F.O.B. FACTORY

MODEL 3CH WET CUT

6¾" x 6¾"



Cast cabinet base with built-in coolant pump & tank, foot lift to saw frame, automatic lift on back stroke, feed pressure control, complete with motor, switch, wired ready to go.

$498.00 F.O.B. FACTORY

Write for Illustrated Catalog 361

KELLER DIV.

Sales Service Mfg. Co.

2365 University Ave., St. Paul 14P, Minn.

Circle No. 60 on Reader Service Card.

Removable Booth Cover

Removal of the cover of the Can-Pro mobile welding booth is now a one-minute task with the addition of Lift-the-Dot fasteners. The flame proof cover now snaps off quickly with nothing to lace or untie. Frame is rugged ¾-inch metal, six-feet high. Four heavy duty ball bearing casters make it ready to move. It can be folded for compact storage and convenient handling. When not in use as a welding booth, it can be used as a chip shield, paint spray booth, or draft control.

Circle No. 247 on Reader Service Card.

Welding Controller

An automated arc welding controller has been announced by Automation Development Corporation. Designated Model 408A, this unique controller automatically positions the electrodes of an arc welder to maintain constant voltage drop across the material being welded. This device consistently and automatically produced high quality welds under the most difficult and exacting conditions. Specifications include: size, 8¾ inch x 11¾ inch x 6½ inch; weight, 13 pounds; control range, 0 to 20 volts; accuracy, 2% of full scale; and power, 115 v, 60 cps. single phase, 35 W.

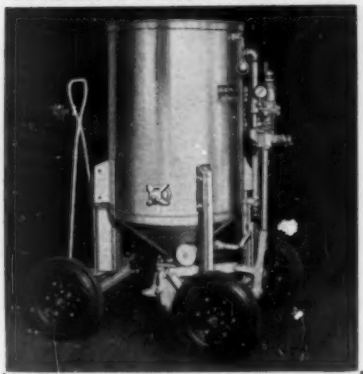
Circle No. 248 on Reader Service Card.

Positioning Finger

An alignment device, called the Air Finger Positioning Gauge, has been developed by the Chrom-O-Lite Co., for use on press brakes. It assures accurate alignment for precision sheet metal bending. Time consumed hand measuring is eliminated. The air actuated positioning guide is operated by a foot pedal. The finger moves out, indicating the correct placement of stock. The finger can be adjusted to pinpoint accuracy.

Circle No. 249 on Reader Service Card.

Circle No. 76 on Reader Service Card.



RUEMELIN GRIT BLASTS

. . . provide fast cleaning action for removal of rust, scale and welding slag after welding has been completed.
Available in several sizes in stationary or portable types.
Can be fitted with remote controls at nozzle. We also build Blast Cleaning Cabinets, Rooms and Rotary Tables. Send us data on your requirements.

Write for descriptive bulletin.

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Ranite **IS STILL THE BEST!**

HAVE YOU COMPARED IT
WITH THE HARD-SURFACING ROD
YOU ARE NOW USING?
IT PAYS TO KNOW!

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For More Information Circle No. 63 on Reader Service Card.

The **FALSTROM**
Controlled Angle Torch

reduces costs!

The only tungsten inert gas, arc welding torch with complete flexibility. Split-second, hand adjustment to any angle . . . to suit job requirements or your own comfort. One torch does the work of many. Model WC-180 is rated at 180 amps, AC-DC. 12½', 25' and 50' hose lengths. Low first cost . . . low maintenance. Get the facts . . . ask for Bulletin WC-60.

FALSTROM COMPANY
222 Falstrom Court
Passaic, New Jersey
PRescott 7-0818

Circle No. 29 on Reader Service Card.

ROADSHOW OF WELDERS housed in a 35-foot aluminum trailer stops in Cleveland, Ohio, to demonstrate arc welding techniques to welding supervisors and operators.

Miller roadshow demonstrates latest welding techniques

CLEVELAND: The Miller Electric Manufacturing Company's Roadshow of Welders made a stop here at Air Products and Chemicals, Inc. Welding supervisors and operators from the Greater Cleveland area who attended saw demonstrations of 13 different welders used for Mig and Tig welding; metallic arc welding, cutting, and gouging; and hardsurfacing.

The Roadshow has already passed through Minnesota, Wisconsin, Illinois, and Michigan. It is housed in a 35-foot electrically-heated and ventilated all-aluminum trailer that has a 7- by 8-foot welding booth with a 20- by 42-inch colored glass for demonstrations.

The welding booth is the central control area for the entire display of welders. All of the welders are wired to the booth, eliminating cumbersome cable, etc. Power is furnished from a 25 KVA generator operating off the engine of the truck that hauls the trailer.

The trailer brings with it an 8- by 35-foot canopy for outdoor demonstrations of arc cutting and gouging and heavy metallic arc welding.

Also demonstrated at Air Products and Chemical's new Cleveland, Ohio, plant were equipment, accessories, and supplies from Arcair Company, Auto-Arc Welding Mfg. Co., McKay Company, O.K.I. Welding Supply Co., and Air Products and Chemical's K-G Equipment Division.

Steve Butler, hard goods manager for Air Products' Cleveland District, handled the arrangements.

Lincoln Foundation Makes Design Awards

CLEVELAND, OHIO: Awards totalling $25,000 for papers on progress in arc welding design of machines and structures have been made by The James F. Lincoln Arc Welding Foundation. Awards were presented to 105 designers and engineers for papers

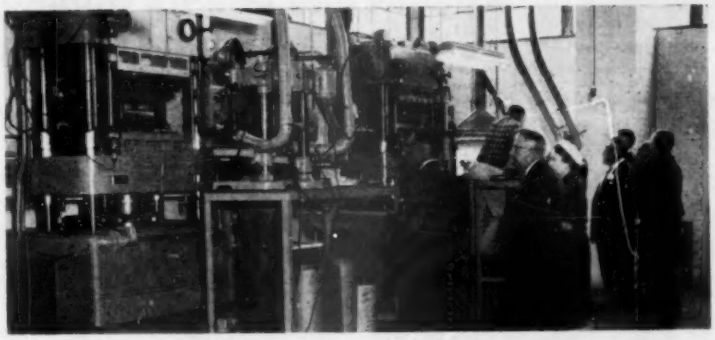
demonstrating how an arc welded steel design improved the appearance or performance of a machine or structure, or how arc welding reduced its cost. Thirty-six awards were made in each of two separate, non-competing divisions: Machines and Structures.

In the Machine Division, First Award of $3,000 went to G. H. Lynn, manufacturing specialist, and I. John Niemkiewicz, design engineer, both employees of the Allis Chalmers Manufacturing Co. plant in Cincinnati, Ohio. The winning paper, "Welding Design, Key to Redesign of Canned Motor Pump" details an estimated savings of $38,440, a 34.9 percent reduction over the old design.

The $3,000 First Award in the Structures Division went to K. E. Dumauld and D. C. Hoffman, design engineers, Bureau of Bridges Division of the Ohio State Highway Department, Columbus. Their paper describes the redesign of the deck and deck girders on a continuous haunched girder bridge. The new design of the superstructure represents a cost savings of $2 per square foot, or 12.7 percent.

more news on page 82

NEWS BRIEFS

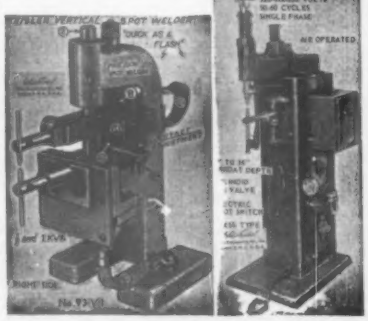


A TOUR of the new Jackson Products plant in Warren, Michigan, showed more than 200 guests how this manufacturer of welding and safety products capitalized on a plant move made to gain more production space by also revamping and streamlining production techniques.

Hosts at the recent open house were (left to right) R. E. Lenhard, president of Air Reduction Sales Co.; A. C. Gilbert, Jackson's general manager; and C. H. Glassier, Airco's executive vice-president.

SALE OF CHASE WELDING SUPPLY CO., Benton, Illinois, has been announced by Mr. and Mrs. Ralph Chase, who founded the company in 1938. Purchasers are Charles and W. J. Puricellio.

EISLER makes the largest assortment of **ELECTRIC SPOT, WIRE BUTT, SEAM, TWEEZER, GUN** and **FLASH WELDERS.** We also carry in stock a variety of **WELDING TIPS** and **ACCESSORIES.**



EISLER ENGINEERING CO., INC.
735 So. 13th St., Newark 3, N.J.

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AMERICA'S FINEST AND NEWEST MANUFACTURER OF BRAZING ALLOYS INVITES YOU TO TRY OUR ALLOYS...

LOW FUMING BRONZE
NICKEL SILVER
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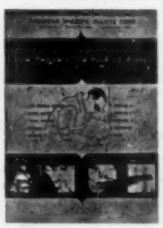
PHOSPHOR COPPER
PHOSPHOR SILVER
SILICON BRONZE
NICKEL BRONZE
ALUMINUM WELDING WIRE



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"What's the secret of your strength, HERCULES?
"No secret – I use only virgin alloys in my spotwelding tips and machine them with the best equipment money can buy."

Resistance Welding Alloys our only product. An abundant inventory of spotwelding tips and related accessories, as well as the various grades of copper-alloy bar stock, maintained at all times.

tips—holders—wheels—copper alloy bar stock, forgings and castings

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for research, design, and development . . . metal fabrication, maintenance and plant engineering

Layout and Set-Up Blocks or Welding Platens

BENDING BLOCKS • BED PLATES • SURFACE PLATES • FLOOR PLATES

Each ACORN Bending Block or Welding Platen has 1¾" square holes, 3½" center-to-center, for clamping, dogging or spacing. Working surfaces and side edges are machined within .005" of flatness. Blocks are semisteel castings with 30,000 to 32,000 psi tensile strength. A wide variety of accessories are also available.

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MODELS

These models are in stock:

2650	2'6" x 5'
4040	4' x 4'
5050	5' x 5'
5060	5' x 6'
5080	5' x 8'
3610	3'6" x 10'

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ONLY **THERMO** GROUND and POLISHED FILTER PLATES CAN GIVE YOU 100% UNIMPAIRED VISION

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Welding Workshop At Trenton State College

TRENTON, N. J.: Trenton State College with the cooperation of the State Department of Education has for the last three years offered a summer welding workshop. Its object? To help reestablish competent teaching of welding in New Jersey's industrial arts laboratories.

This year, the college cooperated with Hobart Brothers Company, Troy, Ohio, and Air Reduction Sales Co., New York City, in presenting to industrial arts teachers the latest arc and oxy-acetylene welding techniques.

Twenty-one high school industrial arts teachers took one week of 3-hour evening sessions and two weeks of 8-hour workshop sessions. Those who participated and met all requirements received three credits and a certificate of competence from the State Department of Education.

COMING EVENTS

January 22-25, 1962: Plant Engineering and Maintenance Show and Conference, Convention Hall, Philadelphia.

April 9-13: A.W.S. Convention and Welding Show, Sheraton-Cleveland Hotel and Public Auditorium, Cleveland, Ohio

April 25-29, 1962: Western Space Age Industries and Engineering Exposition, San Francisco

April 30-May 1, 1962: I.A.A. Convention, Toronto, Ontario, Canada

May 15-17, 1962: N.W.S.A. Convention, Hotel Roosevelt, New Orleans

New Distributors And Sales Representatives

Alloy Rods Company, York, Pa.: General Welding Supply Co., Westbury, Long Island, New York; Peterkin Welding Supply Co., Newburgh, N. Y.

National-Standard Company, Niles, Mich.: Steel Sales Corporation, Chicago, Detroit, Grand Rapids, Indianapolis, Kansas City, Milwaukee, Minneapolis, and St. Louis.

Rankin Mfg. Company, Alhambra, Calif.: Federal Equipment Eastern Ltd., Montreal, Quebec; Interstate Welding Sales Corp., Marinette, Wis.; R & R Welding Supply Co., Rock Island, Ill.; Southwestern Illinois Supply Co., De Soto, Ill.

Data Offered in This Month's Ads

Readers may obtain any of these free reference materials by circling the corresponding numbers on the Reader Service Cards

1: Welding platens are described in literature. **Acorn Iron & Supply Co.**

3: Calcium carbide is featured. **Air Reduction Chemical & Carbide Co.**

5: Double-barrelled tip holder is featured in literature. **Air Reduction Sales Co., Tuffaloy Dept.**

6: Joining manual and catalog is available. **All-State Welding Alloys Corp.**

7: Abrasive cut-off machine is described in Bulletin DH-299. **Allison-Campbell Division, American Chain & Cable Co., Inc.**

8: Experience in welding research is featured. **Alloy Rods Company**

9: Brazing alloys are listed in a catalog. **American Brazing Alloys Corp.**

10: Welding torches for gas shielded arc welding are featured in literature. **American Electric & Machine Co., Inc.**

11: Eye and head safety equipment is featured in a catalog. **American Optical Co.**

12: Low temperature silver brazing is the subject of a booklet. **American Platinum & Silver Div., Engelhard Industries, Inc.**

13: Beveler is featured in literature. **American Pullmax Co., Inc.**

14: Projection welding dies are featured in Bulletin RW-10. **Ampco Metal, Inc.**

15: Hardening compound sample is offered. **Anti-Borax Compounds Co., Inc.**

17: Universal Balance positioner is featured in data. **Aronson Machine Co., Inc.**

18: Welding accessories are featured. **Atlas Welding Accessories Inc.**

19: Carbon arc gouging is featured in material. **Becker Brothers Carbon Co.**

20: Ultrasonic weld inspection is featured. **Branson Industries Inc.**

21: Oxide scale problems are discussed. **Chemclean Products Inc.**

22: Plastic filters are featured in literature. **Chicago Eye Shield Co.**

23: Blow torches are featured in literature. **Clements Mfg. Co.**

24: Press brake is featured in data. **Cleveland Crane & Engineering Co.**

25: Pipe layout equipment is featured. **Contour Sales Corp.**

26: Spot welding tips and equipment are shown. **Eisler Engineering Co., Inc.**

27: Large capacity, multi-conductor cable is described in data sheet. **Electric Arc, Inc.**

29: Controlled angle torches for tungsten inert gas arc welding are described in catalog. **Falstrom Co.**

30: Portable nibblers for cutting all metals are featured. **Fenway Machine Co.**

31: Galvanizing small parts and weldments is described in data. **Galv-Weld Products**

32: Silver brazing alloys and flux is featured in data. **Goldsmith Bros.**

33: Axles, jacks, and couplers are featured in a catalog. **Hammer Blow Tool Co.**

34: Brazing alloys and fluxes are listed in a catalog. **Handy & Harmon**

35: Gas welding and cutting outfit is featured. **Harris Calorific Co.**

36: Resistance welding alloys and tips are featured. **Hercules Welding Products**

37: Semi-automatic welder is described in data. **Hobart Brothers Co.**

38: Electrode holder selection chart is featured. **Jackson Products**

39: Metal cutting band saw is described in literature. **Johnson Manufacturing Corp.**

41: Welding symbols chart is offered. **Lenco, Inc.**

42: Manual submerged arc welding is featured in literature. **Lincoln Electric Company**

43: Oxy-acetylene outfits are on special offer. **Linde Company**

44: Welding distributors and how they serve local needs are described. **Linde Co.**

45: Resistance welding supplies and distributors are featured. **P. R. Mallory & Co., Inc.**

46: Material handling devices are described in a catalog. **Merrill Brothers**

47, 48, 49, 50: "Electrode selector" lists over 1,000 types and sizes. **Metal & Thermit Corp.**

continued on page 84

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TILLMAN

GLOVES-GARMENTS

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WELDING GLOVES MITTENS AND GARMENTS NOW IN POLY BAGS

BRAZILIAN DEERSKIN THE "STAY SOFT" LEATHER GLOVES AND MITTENS

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Air-Cooled and Water-Cooled for Inert Gas Shielded Welding

Type 2WH-7

As pioneers in all-brazed torch construction, we have developed products that are easy to use and maintain, give full gas shielding, and have minimum electrode stub loss.

TYPE 2WH-7 water-cooled torch (shown) for heavy duty welding requiring currents up to 500 amps, 100% duty cycle. Head is of all-brazed, leakproof construction.

TYPE 4AG-7 air-cooled torch ideal for sheet metal work. Can use long cap for 7" electrode or short cap for low clearance work. Current capacity of 150 amps on 60% duty cycle.

TYPE 5AD-1 air-cooled torch with 50 amp current capacity on a 60% duty cycle. Head is flexible with a 45° angle tip. Makes hard to reach jobs on light gage metals become routine.

AMERICAN ELECTRIC & MACHINE CO., INC.
405 Cedar Lane Teaneck, N. J.

Circle No. 10 on Reader Service Card.

DATA FEATURED IN ADS

continued from page 83

51: Rebuilding and salvaging is described. Metallizing Company of \merica

52: Flame spraying hardfacing is described in a bulletin. Metco, Inc.

53: "Rectifiers for welding" is a pamphlet offered. Miller Electric Mfg. Co.

54: Welding and cutting equipment is listed in a catalog. Modern Engineering Co.

55: New Gobbler is described. Modern Manufacturing Co., Inc.

56: Automation techniques and skilled technicians are among the facilities described in data. Morgan Engineering Co.

57: Personal protective equipment is featured. National Cylinder Gas Div.

58: Saucer shaped reinforced wheels with disposable mounts are described in literature. Norton Abrasives

59: Positioners for all welding jobs are described. Progressive Welder & Machine Co.

60: Power hacksaws are featured. Sales Service Manufacturing Co.

61: High strength steel is described in literature. Sheffield Division, Armco Steel Company

62: Portable screens, welding gloves, and safety clothes are featured. Singer Glove Mfg. Co.

64: Welder control planning is described in bulletin SM-277. Square D Company

65: Lens covers of plastic are featured. Thermacote Co.

66: Gloves and garments for welding are described. John Tillman & Co.

67: Resistance welding alloys are listed in a catalog. Tipaloy, Inc.

68: Welding and cutting unit is featured in data sheet. Victor Equipment Co.

70: Portable gas cutting machine is featured in literature. Linde Company

71: Nozzles for gas cutting are described. Linde Company

72: Gaugeless regulators that withstand abuse are featured. Linde Company

73: Cutting torches for all cutting under all gas pressures are featured. Linde Company.

74: Iron workers and accessories are described in literature. Bateman Foundry & Machine Co.

75: Wheels for any job are described. Bay State Abrasive Products Co.

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IT'S NEW: SO HANDY

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In the Shaker Can

"ROYAL" HARDENING POWDER is safe to use. No Toxic fumes. Hardens low-carbon steels equally as well as cyanides.

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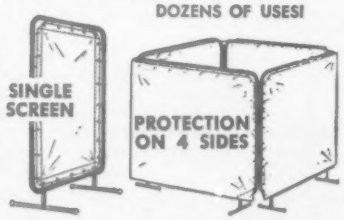

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Ask your dealer or write: *Special Products Division*

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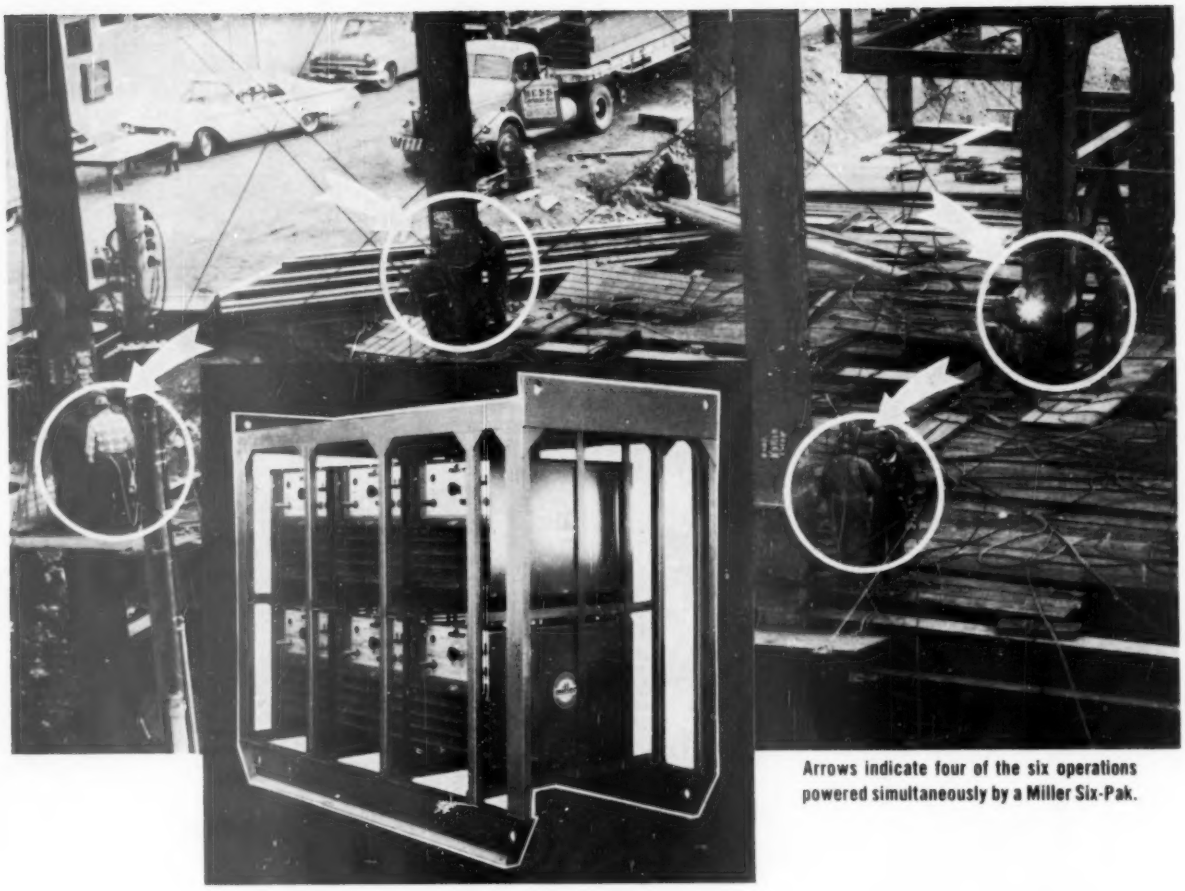

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